INSTRUCTIONS

for the use of instrument
Serial Number _____

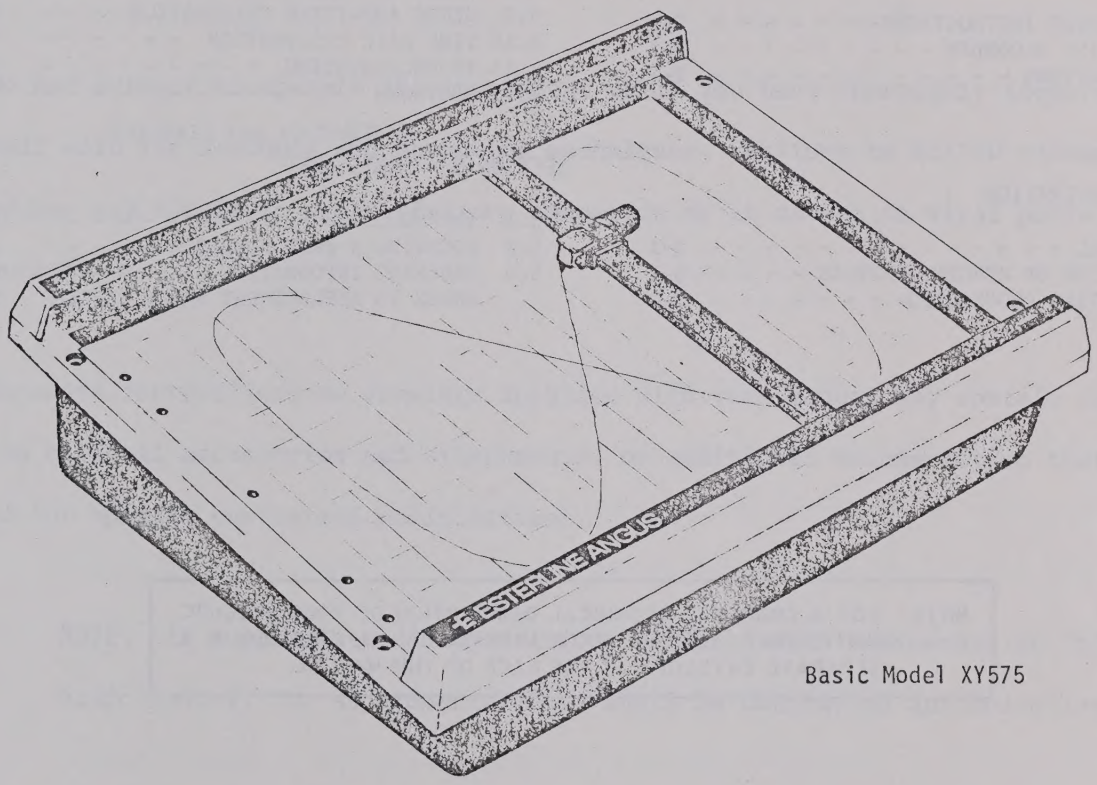
ESTERLINE ANGUS

AN ESTERLINE COMPANY

INSTRUCTION MANUAL

FOR

Esterline Angus Spartan X-Y recorder



Basic Model XY575

M733-P
.5M1177

ESTERLINE ANGUS
AN ESTERLINE COMPANY

CONTENTS

	Page
SECTION 1 - DESCRIPTION	
1.1 INTRODUCTION- - - - - - - - - - - - -	1-1
1.2 GENERAL DESCRIPTION - - - - - - - - -	1-1
1.3 PRINCIPLES OF OPERATION - - - - - - -	1-2
SECTION 2 - INSTALLATION	
2. UNPACKING INSTRUCTIONS- - - - - - - -	2-1
2.2 MOUNTING RECORDER - - - - - - - - - -	2-1
2.3 CONNECTIONS - - - - - - - - - - - - -	2-2
SECTION 3 - OPERATION	
3.1 GENERAL - - - - - - - - - - - - - - -	3-1
3.2 FUNCTION OF REMOTE CONTROLS - - - - -	3-1
3.3 OPERATING PROCEDURES- - - - - - - - -	3-2

	Page
SECTION 4 - MAINTENANCE	
4.1 INTRODUCTION - - - - - - - - - - - -	4-1
4.2 INSPECTION - - - - - - - - - - - - -	4-1
4.3 CLEANING - - - - - - - - - - - - - -	4-2
4.4 LUBRICATION - - - - - - - - - - - -	4-3
4.5 MECHANICAL ADJUSTMENTS - - - - - - -	4-4
4.6 ELECTRICAL ADJUSTMENTS - - - - - - -	4-10
4.7 CHANGING SENSITIVITY/RATE- - - - - -	4-12
4.8 CABLE INSTALLATION - - - - - - - - -	4-12
4.9 SERVO AMPLIFIER CALIBRATION- - - - -	4-13
4.10 TIME BASE CALIBRATION - - - - - - -	4-13
4.11 TROUBLESHOOTING - - - - - - - - - -	4-14
4.12 SHUTDOWN - - - - - - - - - - - - - -	4-14
SCHEMATICS and DIAGRAMS	
SECTION 5 - PARTS LIST	
5.1 INTRODUCTION - - - - - - - - - - - -	5-1
5.2 LOCATING A PART NUMBER - - - - - - -	5-2
5.3 ORDERING INFORMATION - - - - - - - -	5-2
INDEX TO REPLACEMENT PARTS TABLES-	5-2

NOTE: FOR A COMPLETE TECHNICAL DESCRIPTION OF YOUR SPECIFIC INSTRUMENT, SEE THE DATA SHEET WHICH IS SUPPLIED IN A SEPARATE ENVELOPE AT THE BACK OF THIS MANUAL.

TECHNICAL PUBLICATIONS SECTION

L. Deane, Editor — L. Scott, Writer — L. Turner, Copy Preparation — M. Hatley, Compilation

J. Christ, Sr. Writer — P. Roe, Illustrator — M. Miedema, Art Assistant — G. McCammack, Photography

ESTERLINE ANGUS INSTRUMENT CORPORATION
P.O. BOX 24000 · INDIANAPOLIS, INDIANA 46224

© Esterline Angus Instrument Corp. 1976

SECTION 1 — DESCRIPTION

1.1 INTRODUCTION

a. This preliminary instruction manual describes the basic X-Y graphic recorder offered in the Esterline Angus *SPARTAN* instrument line. The instructions include a general description of the Model XY-575 Recorder, installation and operating procedures, wiring diagrams, and a complete replacement parts list.

b. Do not attempt to operate the instrument until you have thoroughly acquainted yourself with its features and operating techniques. Failure to follow recommended procedures may result in unsatisfactory operation or in damage to vital parts of the instrument.

c. Separate instructions or drawings supplied with this manual may contain information on optional accessories and attachments, or additional documentation that is required for special customized modifications.

> NOTE: If supplemental documentation conflicts with statements in this basic manual, the supplemental data shall be considered authoritative.

d. For a complete detailed description of your particular recorder, refer to the Data Sheet originally supplied with the instrument.

1.2 GENERAL DESCRIPTION

a. *SPARTAN* X-Y Recorders are precision general-purpose instruments designed to plot Cartesian coordinate graphs through the use of independent horizontal (X-axis) and vertical (Y-axis) internal measuring systems. The relationship between two analog

functions (represented by DC or low-frequency AC voltages) may be measured and graphically recorded on all models. In addition, models equipped with the internal time base option can also plot any Y-axis function in relationship to a known time rate on the X-axis.

b. The instrument employs an entirely new design concept in its Y-axis shuttle assembly. This *"Uniglide"* module contains not only a snap-in disposable ink cartridge but also an electrical pen-drop solenoid. Drive positioning cables carry controlling power to the solenoid so that the recording pen tip can be lowered and lifted rapidly by the operator. This capability makes possible combinations of solid and broken line traces. Another design feature is the illuminated graticules that are used to align the graph grid rather than the edge of X-Y paper.

c. Model XY-575 Recorders are available in either English (inch) or Metric (centimeter) calibrations. The basic instrument is without front-panel controls, but provides either internal connection terminals or an optional remote connector for all operating functions. This simplicity feature increases the versatility of the instrument when it is to be interfaced with other equipment.

NOTE: Refer to separate supplemental instructions for a description of the Control Module option.

1.3 PRINCIPLES OF OPERATION

a. The instrument is designed to simultaneously measure and record two independent variables by electro-mechanical positioning of a single inking pen on calibrated graph paper. Vertical disposition of the recording pen is controlled by the instruments Y-axis system, while the pen is positioned horizontally by the X-axis system.

Since the functional components of each system are basically the same, the following discussion will be limited to only one recording axis.

b. A basic system configuration is illustrated in the block diagram of Figure 1-1. Although the overall system operates on a null-balance principle, its functional stages may be divided into two major sections: (1) the input signal-conditioning circuits--which include preamplification, range components, and zero adjustment; and (2) the servo measurement loop--which includes servo signal amplification, a DC balance motor, and a feedback network.

1.3.1 Signal Conditioning Circuits

a. As shown in Figure 1-1, the input signal voltage is first applied to an R-C rejection filter to reduce power line pickup. The signal is then passed on to range determining preamp stage IC1. Here, the input signal is amplified and resistor R_R is chosen for the desired range of sensitivity. Although direct signal coupling is used on all MV input sensitivities, additional divider resistors are required for voltage input ranges. Span Adjust R3 is used to trim the selected range accuracy.

b. Preamplified signal voltage e_S is next coupled to one input section of differential amplifier IC2. The other input section of this stage receives an offset potential E_o. This voltage is established by manual adjustment of 10-turn Zero pot R_Z. The zero control is used to position the recording pen at the zero reference point on the graph paper, or to elevate or suppress zero as much as 100% of the graphic scale. Stability is maintained in the offset circuitry through the use of fixed bias voltages from the regulated reference supply.

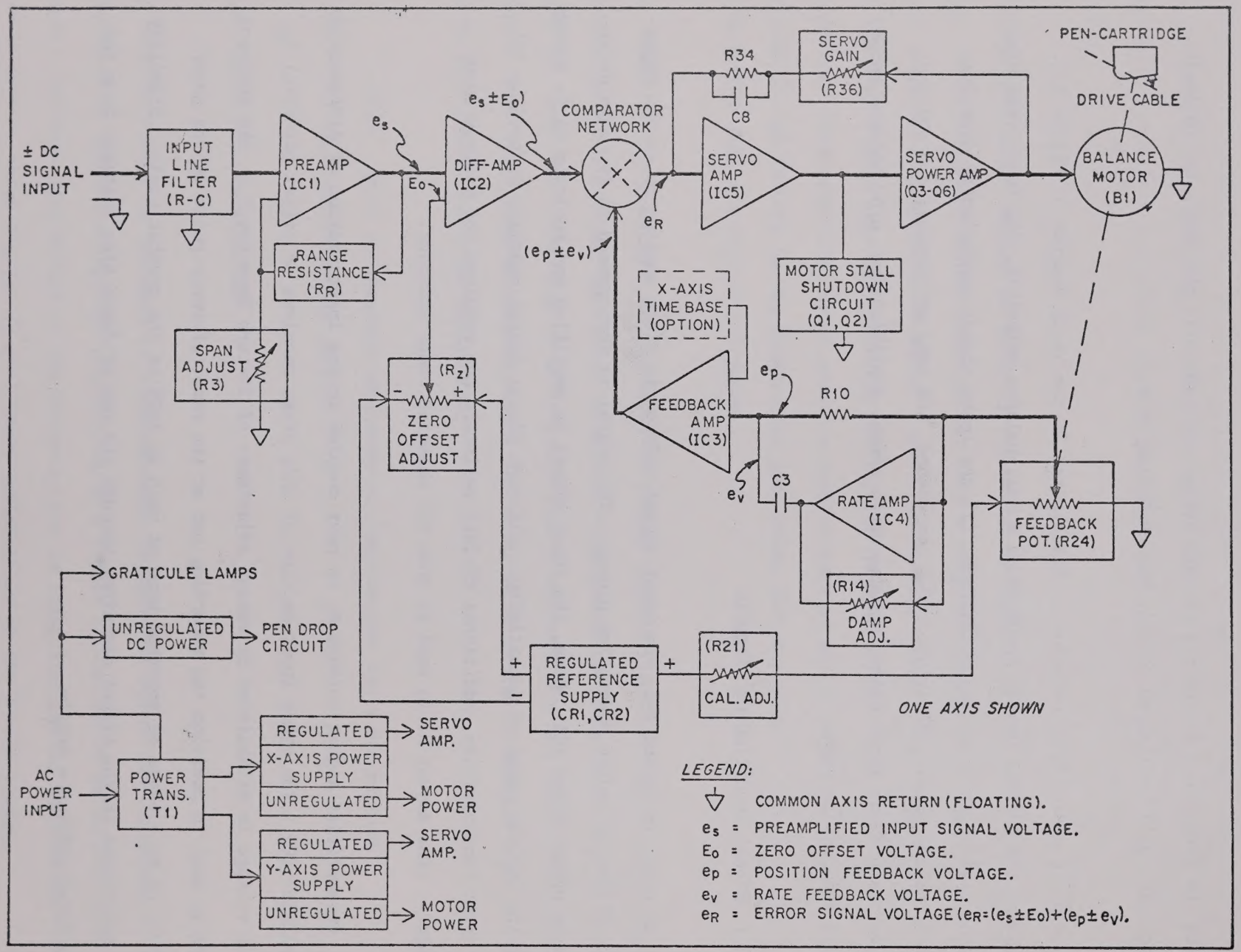


Fig. 1-1. Simplified Block Diagram of Basic Recorder.

c. Signal voltage e_S and zero offset voltage E_O are algebraically summed at IC2. The differential output is then applied to a comparator network along with feedback signal e_P through resistor R10. Voltage e_P is directly proportional to the arm position of feedback pot R24 (equivalent to axis pen position). The two signals are compared in this network and, under "off-null" conditions, they will be unequal; consequently, an error signal voltage e_R will develop across the input of amplifier IC5.

1.3.2 Servo System

a. In the basic servo-measurement loop, the error signal is first amplified by IC5 and is then fed to the servo power amplifier. This circuit consists of signal inverter transistors Q3 and Q4 as well as output driver transistors Q5 and Q6. Gain adjust R36 regulates the overall amplification of the servo loop, while resistor R34 and capacitor C8 limit bandwidth of the amplifiers to reduce noise response.

b. Drive current from the power amplifier is delivered to balance motor B1 until the arm of the feedback pot reaches a voltage value directly proportional to the magnitude of the conditioned input signal. At this point the system is balanced, and the recording pen will come to rest at a new position on the graph axis. Signal polarity and amplitude determine the direction and speed of motor rotation.

c. The servo feedback system includes a dynamic damping circuit which is automatically regulated by velocity of the balance motor. The motor velocity signal is obtained from the arm of the feedback pot where it is introduced to rate amplifier IC4. Damp Adjust R14 varies the gain of this stage so that the operator can set the amount of rate feedback required for optimum servo response. From IC4, the rate signal is coupled through capacitor C3 and is then algebraically added to the pen position voltage at feedback amplifier IC3.

This stage, in turn, applies feedback voltages to the signal comparator network as previously described.

d. When the system is at null or rest, rate feedback will be zero while input and position signals are equal. The rate feedback circuit is effective only when the system is approaching balance; at which time its voltage subtracts from the error signal thus causing the balance motor to anticipate the correct stopping point without excessive overshoot.

e. The "motor stall shutdown circuit" shown in the block diagram of Figure 1-1 functions precisely as its name implies. To protect the balance motor and its associated clutch mechanism, this circuit automatically reduces the driving signal whenever the motor is stalled for more than a few seconds. The circuit employs a pair of J-FET transistors (Q1 and Q2) which are connected in parallel across the signal path. One transistor is biased as a positive signal switch and the other as a negative signal switch. If the drive signal reaches a positive or negative 10- to 12-volt level, one of the transistor switches will "turn on"--thus reducing voltage to the servo power amplifier by effectively grounding the signal through a low resistance. Switching action is purposely delayed by sampling the drive signal through slow time-constant networks.

f. Reference voltage for the servo feedback pot is supplied from a zener-regulated source. Cal Adjust R20 is provided in the reference circuit for precise adjustment of this voltage. The approximate reference potential supplied across the active portion of the X-axis feedback pot is +1.5 volts, while the Y-axis pot receives +1 volt.

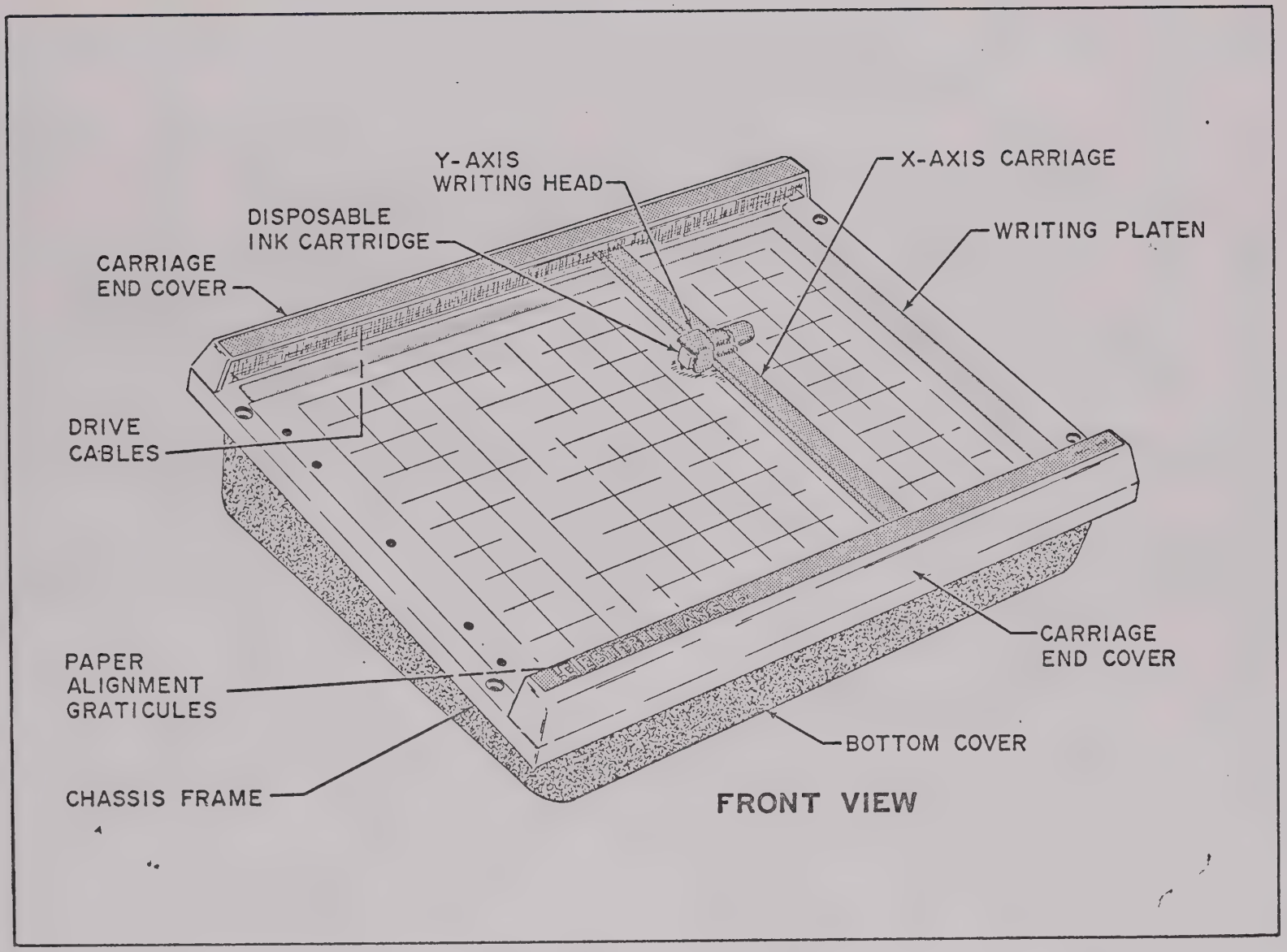


Fig. 1-2A. Location of Major Components.

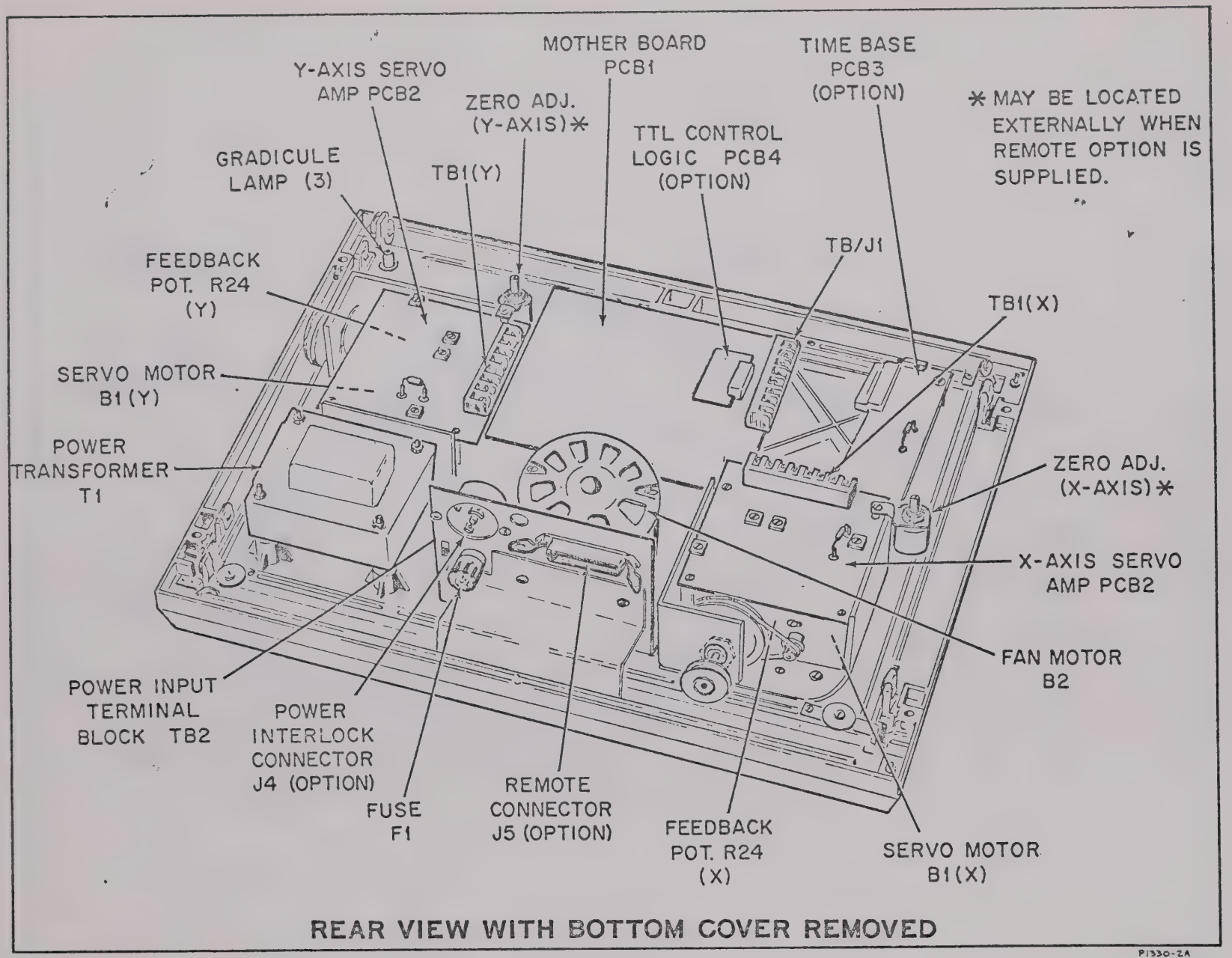


Fig. 1-2B. Location of Major Components.

SECTION 2 – INSTALLATION

2.1 UNPACKING INSTRUCTIONS

a. The following standard items have been inspected and carefully packed in the Model XY-575 shipping carton. Optional items are supplied only if originally ordered.

ITEM	QTY.
Recorder Chassis (with bottom cover)*	1
Ink-Cartridges (6-Pack)	1
Graph Paper, English or Metric	Box of 100 Sheets
Instruction Manual	1
Remote Connector Plug (Option)	1 A/R
Mask, Writing Platen† (Option)	1 A/R

* Will include Control Module Option, if ordered.

† For use with small size graph paper.

b. Remove the packing material carefully and check off all items listed on the packing slip as they are unpacked. If special items were ordered, they will appear on the packing slip. After all items have been removed, make a complete inspection of the shipment for physical damage. If the shipment has been damaged in transit, notify the carrier and Esterline Angus immediately.

CAUTION: Do not attempt to operate a damaged instrument.

2.2 MOUNTING THE RECORDER

The versatile Model XY-575 recorder may be used as a bench instrument by simply placing it horizontally on its bottom cover, or it may be mounted in a rack or panel as a

permanent installation. Figure 2-1 provides recorder dimensions, as well as information for panel mounting. Dimensions have also been provided which will be of assistance when selecting the hardware required for rack or panel mounting (screw length will depend on panel thickness).

2.3 CONNECTIONS

Connection methods for power and signal input will depend upon the model supplied and options ordered. All standard variations are covered in the following paragraphs.

2.3.1 Power Connections

a. The recorder has been pre-set at the factory for the power input specified upon order. This input, reflected on the Data Sheet, should agree with the voltage appearing on the Power Selector Switch located on the rear panel of the Vacuum Fan and Power assembly. If it does not agree, or if an input other than that specified is to be used, then the switch position must be changed to agree with the input to be used (115V AC or 230V AC), and the fuse must be checked and changed,(if necessary) to the correct rating as follows:

1. For 115V AC (50-60 Hz) input, use a 1A, 250V Slo-Blo fuse.
2. For 230V AC (50-60 Hz) input, use a 0.5A, 250V Slo-Blo fuse.

CAUTION: Do not change the switch from one input to another without testing source voltage and changing the fuse.

b. Whether a power cord is supplied or connections are made directly to the recorder in the field, it is imperative that the ground connection from the instrument be terminated at a satisfactory earth ground (such as a water pipe). When making internal

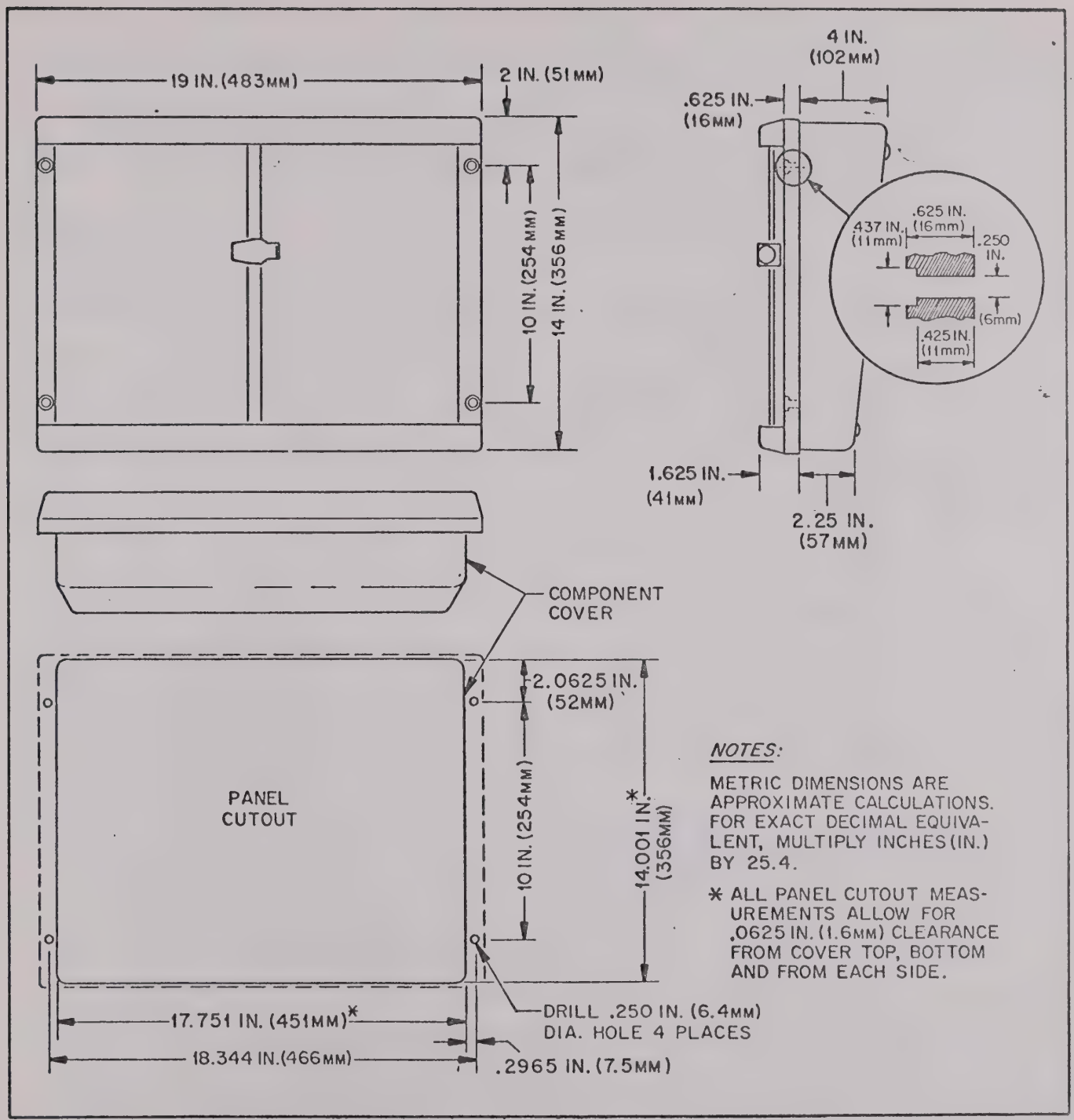


Fig. 2-1. Installation and Dimensional Diagram.

NOTE: See Appendix supplement for recorder with Control Panel option.

connections, connect the earth ground lead to terminal 5 of TB2. This terminal block is located on the Vacuum Fan and Power assembly. On basic models, an external power switch may be installed by removing jumper wire and connecting switch across terminals 1 and 2 of TB2.

c. POWER CORD SUPPLIED: When a power cord has been supplied and is already attached to the instrument, simply plug it into the appropriate power supply outlet. If the Power Interlock option is supplied, first twist the interlock-cabling plug onto the receptacle located on the Vacuum Fan and Power panel, then plug the other end of the cable into the power source.

d. WITHOUT POWER CORD: When power cord options have not been ordered, power connections must be made directly to the power input terminal block (TB2)--located on the Vacuum Fan and Power assembly. To make proper connections, refer to the connection decal located inside the bottom cover, or to the wiring diagram in this manual.

2.3.2 Signal Input Connections

a. Although both signal axes are designed for single-ended inputs, two-wire shielded cable is generally recommended for most applications. The Low (-) signal input is isolated from chassis ground within the recorder to permit floating common-mode operation. Signal commons for each axis (X and Y) are also isolated from each other to prevent interaction and to provide a means for making different input-signal terminations.

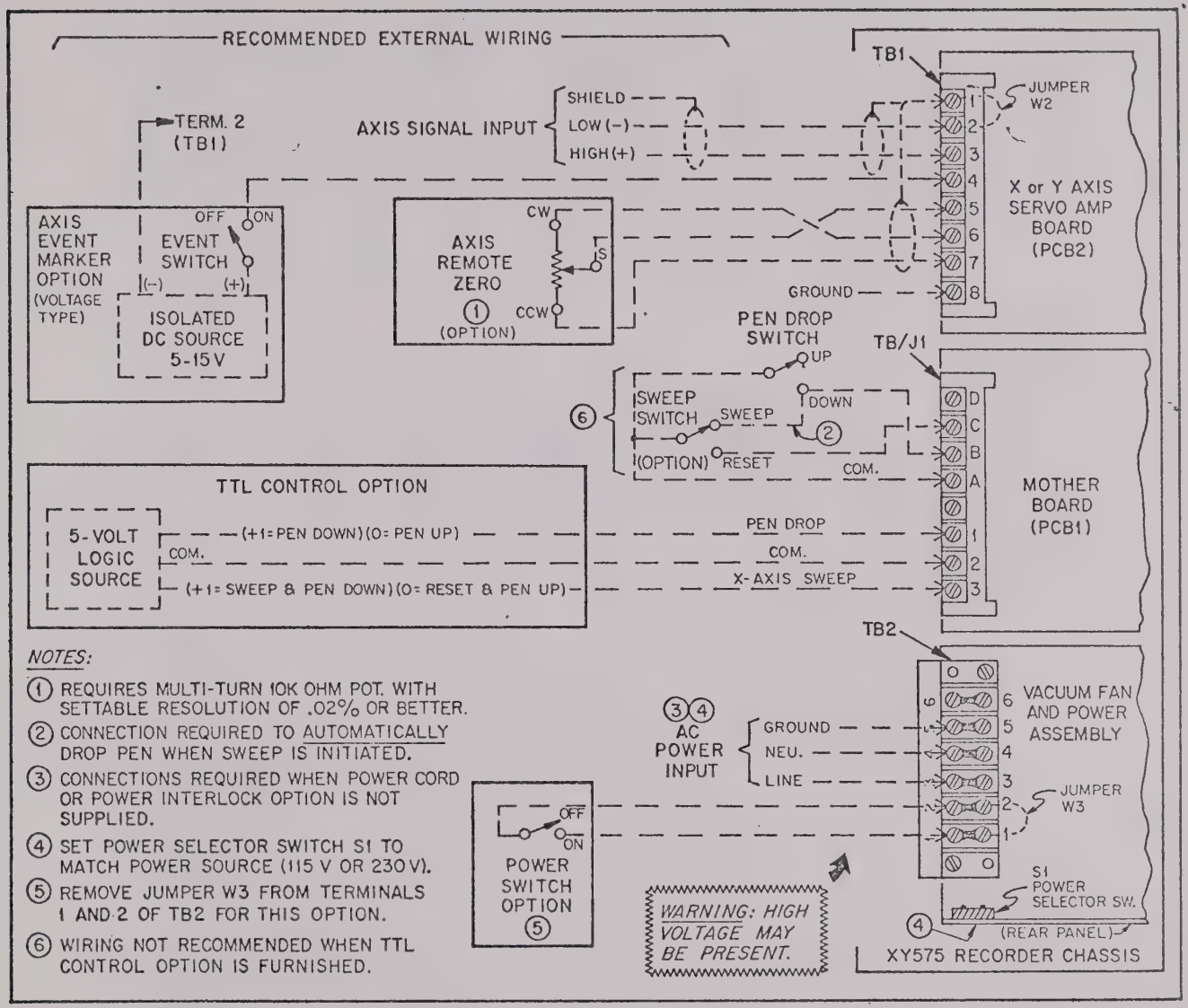
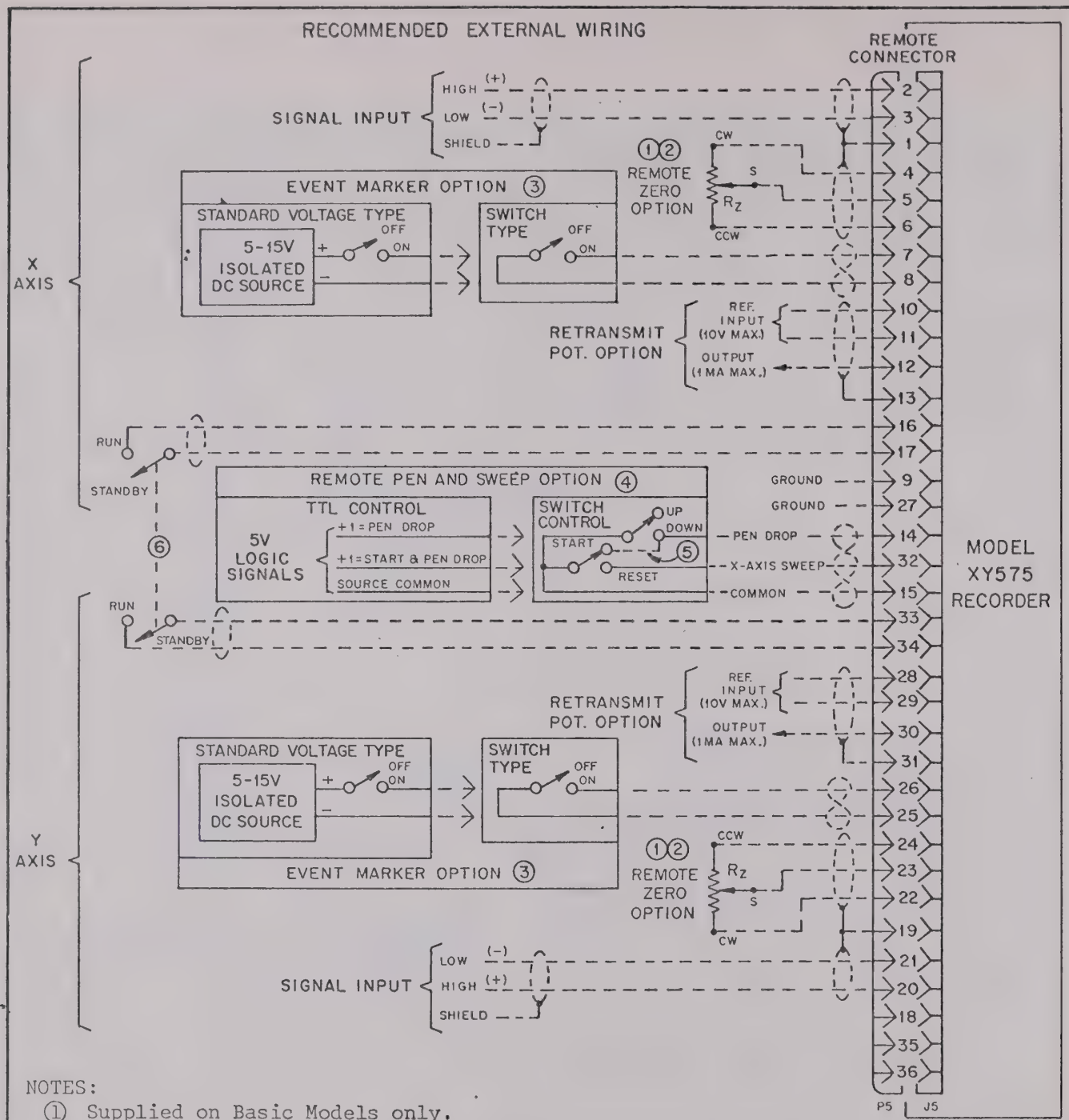


Figure 2-2. External Connection Diagram for Basic Model XY575 Recorder.

NOTE: See Appendix supplement for recorder with Control Panel option.



NOTES:

① Supplied on Basic Models only.

② Requires multi-turn 10K ohm pot with settable resolution of .02% or better.

③ Recorder is wired for only one type of actuation--either VOLTAGE or SWITCH (see Data Sheet).

④ Wire only one function--either TTL or SWITCH (see Data Sheet). Lab models; remove jumper from P5 (pins 15 & 32); position "local" recorder switches correctly (Pen "Up" & Sweep "Reset"); for local operation, place remote switches in the same positions.

⑤ Connection required to automatically drop pen when sweep is initiated.

⑥ Requires DPST switch. Use 2-wire shielded cable for remoting distances over 2'. Connect X-axis shield to terminal #1 of P5 and Y-axis shiled to terminal #19 of P5. For Lab models, either recorder or external switch must remain in "STANDBY" position during selected (local or remote) operation.

P1430 C

Fig. 2-3. Remote Connector Wiring Diagram (see notes).

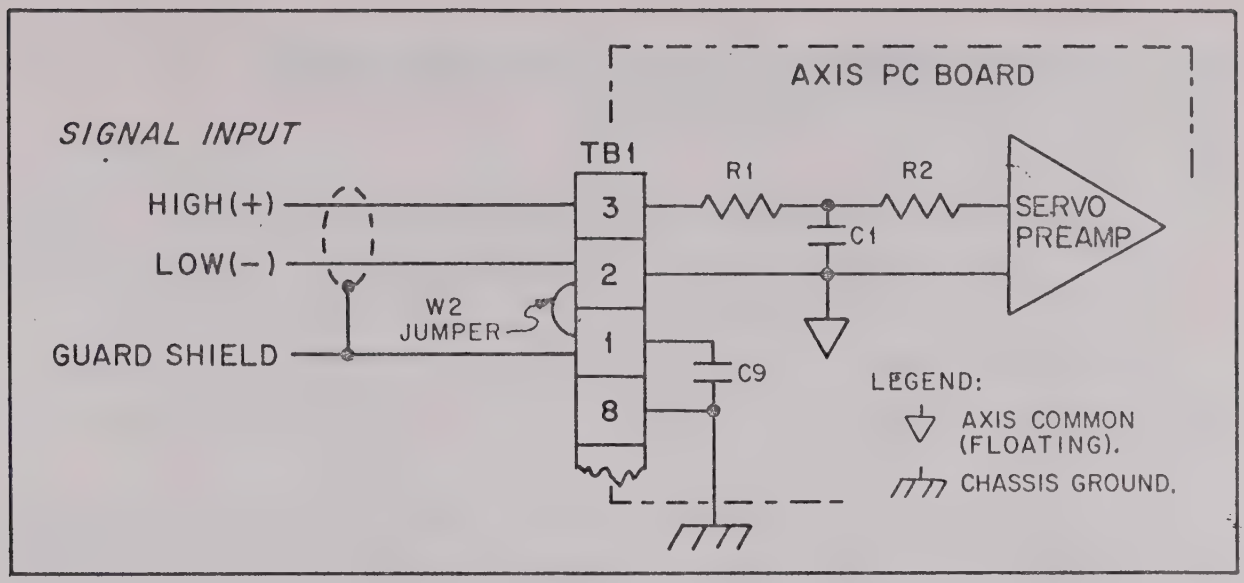


Fig. 2-4. Internal Signal Input Wiring for Basic (OEM) Recorders.

b. Input shielding may be terminated both at the signal source and at the recorder; however, objectionable ground loops are usually minimized by grounding at only one point in the input circuitry. If the Low side and shield are grounded at the signal source, internal jumper W2 may be removed from across terminals 1 and 2 of TB1 (see Figure 2-4). Another alternate configuration might be to connect a floating input shield directly to ground at the recorder (terminal 8 of TB1).

CAUTION: Maximum signal input without voltage dividers is ±15V DC. Maximum common mode is ±200V DC.

c. BASIC RECORDER: Signal input connections can be made directly to terminal blocks TB1-X and TB1-Y located on the respective Servo Amplifier PC boards. Refer to Figure 2-2 or to the connection decal located inside the bottom cover for specific connection information.

d. REMOTE SIGNAL INPUTS: When the Remote Connection option is supplied, all internal connections will have been completed at the factory. However, signal input

leads must be wired to the Remote Connector Plug (P5) in the field. Refer to Figure 2-3 for the correct pin connections.

NOTE: "Internal" screw-terminal connections for signal inputs are not provided on recorders with Control Panel option (Lab Models).

2.3.3 Remote Control Connections

a. BASIC (OEM) MODELS: Remote control capabilities for signal inputs, zero adjustment, pen drop, sweep/reset control, event markers, retransmit pots, and run/standby switching may be provided when the optional Remote Connector is supplied. Refer to Figure 2-3 for correct pin connections to Remote Connector plug (P5). Remote functions for signal inputs, zero adjustment, pen drop, sweep/reset control, voltage-type event markers, and power on/off can also be achieved on recorders not having the optional remote connector by simply wiring external controls directly to terminal blocks located within the instrument. This method of wiring, however, will not offer the operator the quick disconnect feature provided by the total remote option. To make direct internal connections, remove four screws that secure the bottom cover and refer to Figure 2-2 or to the connection decal located inside the cover.

b. LAB MODELS: Remote control capabilities for signal inputs, pen drop, sweep/reset control, event markers, retransmit pots, and run/standby switching may be provided when the Remote Connector option is supplied. Refer to Figure 2-3 for correct pin connections to Remote Connector plug (P5). A jumper wire is supplied on P5 for local operation of the pen drop switch; remove this jumper to wire remote switch. When this instrument is not supplied with the remote connector option, external connections may be made to internal screw terminals for the following remote functions: pen drop, sweep/reset control, voltage-type event markers, and power on/off. To make direct internal connections, remove four screws that secure the bottom cover and refer to Figure 2-2 or to the connection decal located inside the cover.

SECTION 3 — OPERATION

3.1 GENERAL

This instruction section describes the controls and operating procedures for the basic version of the Model XY-575 Recorder. Refer to supplemental instructions for control module option.

3.2 FUNCTION OF BASIC CONTROLS

a. Operating controls necessary for the basic recorder are wired externally either by direct connection to internal terminal blocks or through an optional remote-control connector. These primary adjustments include the following:

(1) Two ZERO ADJUST controls -- one for the X axis and one for the Y axis (external option).

(2) Power switch -- controls AC power to recorder (external option).

(3) PEN DROP switch -- raises or lowers the writing head electrically.

b. Functions of the basic controls are described in the following paragraphs.

3.2.1 Zero Controls

The X-axis and Y-axis ZERO ADJUST controls are used to set the zero reference position for each respective axis. Zero of each axis may be offset ±100% of the full graph scale.

NOTE: Refer to ¶4.6.1 in the Maintenance Section of this manual for zero offset adjustment procedures.

3.2.2 Power Switch

This switch may be wired in series with the AC line (see connection diagram). The "on" position of this switch applies AC power to the recorder. The "off" position removes power completely.

NOTE: Power switch must be "on" in order for PEN DROP switch to function and lower the pen tip onto the graph paper.

3.2.3 Pen Drop Switch

With POWER switch "on", the "off" position of the PEN DROP switch will lift pen "up"; the "on" position drops pen "down". Any SPST contacting-device may be used. The circuit controls 30-volts at approximately 250 milliamperes.

NOTE: Removal of instrument power will lift pen "up" regardless of PEN DROP switch position.

3.3 OPERATING PROCEDURES

Prepare recorder for operation by performing the following steps:

NOTE: For instruments with Control Panel Option, refer to supplemental instructions.

3.3.1 Preliminary

a. Make sure that external connections have been made as shown in Figure 2-2 or 2-3. Place POWER switch in "off" position.

b. DO NOT apply measuring signals to X-axis and Y-axis signal input leads at this point. Connect shorting jumpers between terminals 2 and 3 of each TB1 or, if remote option is supplied, between pins 2 and 3, and between pins 20 and 21 on connector P5. Plug connector P5 into remote connector (J5, Figure 1-2B) at rear

of recorder.

c. Turn ZERO ADJUST controls (both axis) to maximum clockwise position. Then, make 4 turns in the counterclockwise direction.

d. Place PEN DROP switch in its "off" position.

e. Place POWER SELECTOR switch (S1, Figure 1-2) in appropriate position (either 115 V or 230 V) to match power source requirements.

> NOTE: A 1A line fuse is required for 115 V operation, and a 0.5A fuse for 230 V operation.

f. Make necessary power connections to recorder as described in Section 2 installation procedures.

3.3.2 Writing System

a. The writing system consists of a disposable fiber tip pen and ink cartridge assembly (red ink is standard). The cartridge snaps into a spring-clip holder located at the front end of the writing head. Initial installation and routine changing of the snap-in cartridge should be performed with power to recorder turned off.

> NOTE: Before installation or changing of ink cartridge, it is recommended that a scrap sheet of paper be placed beneath the writing head for temporary use as a buffer to prevent markings of ink on writing platen or graph paper (if already inserted). After cartridge has been installed or changed, remove buffer paper.

b. INITIAL CARTRIDGE INSTALLATION

(1) An accessory package of 6 red-ink cartridges is shipped with the recorder. Protective caps are placed over the fiber tip pens.

(2) Obtain ink cartridge from accessory supplies. Remove protective cap from pen tip.

(3) Grasp cartridge between thumb and forefinger, and position cartridge so that pen tip faces away from the spring-clip holder in writing head.

(4) Place bottom, rear end of cartridge between side clips of holder. Then, pivot cartridge upward and push inward until detent on each side of cartridge slides past the clip and fastens.

c. CHANGING CARTRIDGE

(1) Grasp old cartridge between thumb and forefinger. Pull cartridge outward with a side-to-side motion until cartridge is freed from spring-clip holder.

(2) To install new cartridge, perform Steps (2) through (4) under "Initial Cartridge Installation".

d. PEN CARE

(1) The disposable fiber tip pen and cartridge assembly provides a neat and clean inking system. Clogging, blotting, priming, skipping, and the necessity for cleaning have been eliminated.

(2) If recorder is not to be used for several days, place protective cap over fiber tip pen to prevent drying out. Should the pen fail to write after periods of non-use, inking can generally be resumed by merely moistening the fiber tip of the pen.

3.3.3 Initial Paper Insertion

NOTE: Also, see paragraph 3.3.5.

a. An accessory package containing 100 sheets of calibrated graph paper is supplied with the recorder.

b. Insert and position graph paper on writing platen as follows:

(1) Apply power to the recorder with POWER switch. Carriage bar (X axis) and writing head (Y axis) should self-balance within the normal recording area of the writing platen. Adjust ZERO controls if necessary.

(2) Place scrap sheet of paper beneath writing head for temporary use as a buffer to absorb any accidental ink markings (if pen is installed) and to permit easier sliding of graph paper beneath carriage bar as in Step 3.

NOTE: For small size paper, it is recommended that optional mask No. 733C27 be placed over platen with air holes properly aligned.

(3) Obtain sheet of graph paper from accessory supplies. Insert right-hand side of graph paper between writing platen and buffer sheet, and slide graph paper underneath carriage bar. Remove buffer sheet of paper.

(4) Align grid on graph paper with the illuminated graticules on writing platen as shown in Figure 3-1. Air vacuumed through holes in the writing platen will hold paper in place.

NOTE: Although a platen is available for metric graph paper, ISO "A3" size paper may be used on recorders with standard platens by aligning inter-grid lines with graticules for zero references.

3.3.4 Record Mode

(1) Place POWER switch in "off" position.

(2) Remove signal-input shorting jumpers that were connected in Step 3.3.1b, and apply signals to be measured to the X- and Y-axis input leads.

> CAUTION: Maximum signal input without voltage dividers is ±15V DC. Maximum common mode is ±200V DC.

(3) Place POWER switch in "on" position. A positive input signal will drive the horizontal X-axis to the right and the vertical Y-axis upward.

> NOTE: Noisy input signals or improper grounding at the input may result in unpredictable fluctuations in the recorder. If this condition is allowed to persist, it will cause excessive wear in the feedback potentiometers. Mechanical stops and a slip clutch are provided to prevent damage to the drive mechanism or the feedback potentiometers if an overrange signal is applied to the input terminals. The slip clutches will emit an audible noise to alert the operator of the overrange condition. Do not permit clutches to slip for long periods of time.

(4) Set X- and Y-axis ZERO ADJUST controls for desired offsets (±100% of graphic scale) applicable to the measuring requirements.

(5) Lower the pen and begin recording by placing PEN DROP switch in its "on" position.

3.3.5 Routine Changing of Paper

After paper has initially been inserted at start-up of operations, routine changing of the paper may be accomplished as follows:

(1) Set POWER switch and PEN DROP switch in their "off" positions.

(2) Manually position carriage bar and writing head to their mid-travel positions.

(3) Remove existing graph record from writing platen. Slide right-hand side of new graph paper sheet underneath carriage bar.

(4) Turn POWER switch "on". With X- and Y-axis servo action initiated, align grid on graph paper with the illuminated graticules on writing platen as shown in Figure 3-1.

(5) Set PEN DROP switch to "on" position so that pen begins to record on graph paper.

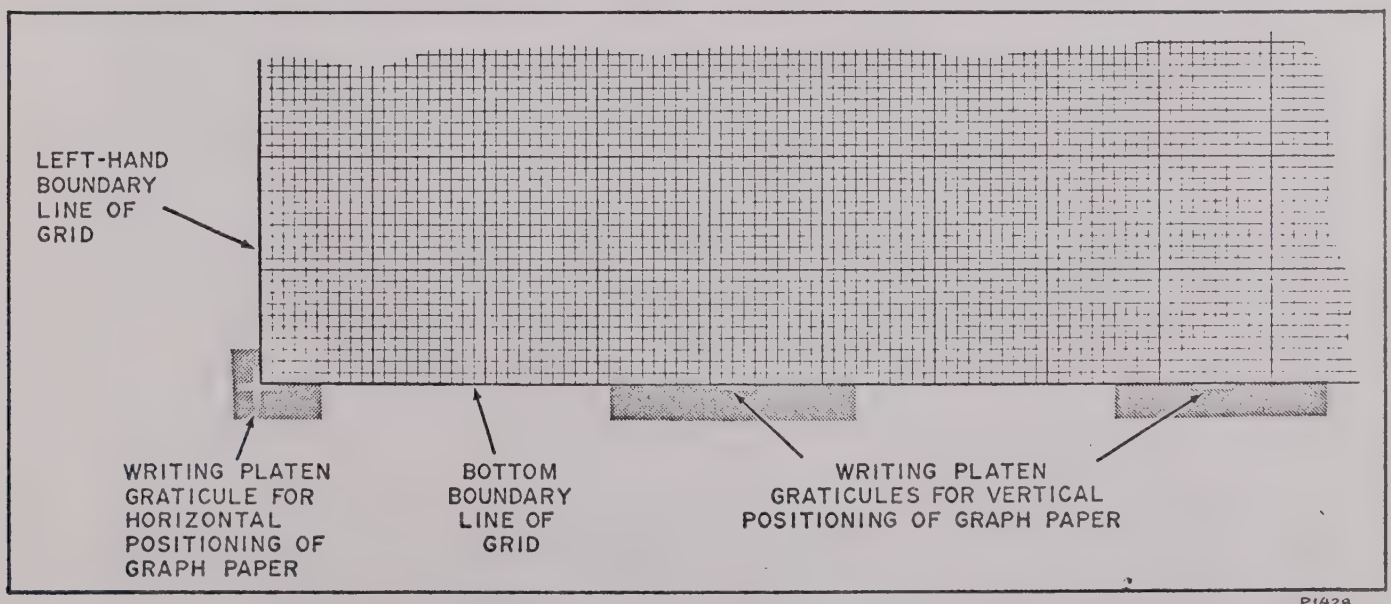

LEFT-HAND BOUNDARY LINE OF GRID
WRITING PLATEN GRATICULE FOR HORIZONTAL POSITIONING OF GRAPH PAPER
BOTTOM BOUNDARY LINE OF GRID
WRITING PLATEN GRATICULES FOR VERTICAL POSITIONING OF GRAPH PAPER
P1428

Fig. 3-1. Graph Paper Alignment.

SECTION 4 — MAINTENANCE

4.1 INTRODUCTION

a. This section of the manual is devoted to the general upkeep and routine maintenance procedures required for Model XY-575 Recorders.

NOTE: Refer to supplemental instructions if maintenance procedures are required for optional attachments or special modifications.

b. Periodic maintenance schedules should be established and followed to ensure trouble-free operation. Where extreme temperatures or contaminated atmospheres prevail, maintenance scheduling should be more frequent. Since frequency of use and environment conditions will vary, maintenance scheduling is left entirely up to the discretion of the user. Routine maintenance will consist primarily of a general inspection of all electrical and mechanical components, cleaning, replacement of graph paper and ink cartridges, and a calibration check when desired.

c. All functional systems of the recorder are accessible with the bottom cover removed from the chassis frame. Refer to Figure 1-2 for the location of all major components.

4.2 INSPECTION

A complete visual inspection of the instrument should be made at each routine maintenance period in order to detect the possible onset of a malfunction. Particular attention should be given to the following:

WARNING: Disconnect power and high-potential signals before removing instrument cover.

(1) SUPPLIES: Recording pen excursions will determine the frequency with which the writing system will run out of ink. A simple record of cartridge and graph paper usage will be a handy reference during inspection periods. Also check the reserve of these items at this time to assure that an adequate supply is on hand.

(2) DIRT: Check for accumulation of dirt, dried ink or other foreign bodies on the pen tip, writing platen, and in all moving parts of the carriage and writing head assemblies.

(3) CONNECTIONS: Look for damaged wiring and loose connections at the internal terminal blocks, at lead connector posts on PC boards, and at all cable connectors.

(4) MECHANICAL DRIVES: Test for freedom of movement in the X-axis carriage assembly and in the Y-axis writing head assembly. Check tension of servo drive cables and gear-belt couplings. Make sure that all mounting hardware items are tight.

(5) VACUUM HOLD DOWN: See that vacuum fan motor is operating properly and that air passages are not restricted.

(6) CONTROLS: Test functional condition of all operating controls and switches.

4.3 CLEANING

a. Regardless of the precautions taken, dirt and dust will enter the recorder chassis area; therefore, periodic cleaning of the exposed components within the instrument will be required.

b. A soft-bristled brush or low vacuum system, a lint-free cloth, and a suitable solvent are all that are required to clean the interior of the instrument. Mild soap or detergent may be used to clean the writing platen or optional mylar mask, front surfaces, and bottom cover. Do not use harsh solvents as they may damage certain components. Esterline Angus recording ink is water based and can be removed with a wet cloth.

CAUTION: Exercise care to avoid disturbing electrical wiring and mechanical alignment of parts when cleaning internal components.

c. The servo drive cables should be kept clean at all times. A dry lint-free cloth may be used for this purpose. Grease or oil deposits may be removed by moistening the cloth with a commercial petroleum solvent.

CAUTION: Do not lubricate pulleys, cables, or gear-belt systems.

4.4 LUBRICATION

a. The only component in the instrument that will require periodic lubrication is the vacuum fan motor. Using an external vacuum system, first clean the motor thoroughly and then place about 10 drops of oil in the opening at each end of the motor housing. The top opening is accessible through a hole at the rear of the mounting bracket. If hole is concealed by optional impeller cover, remove two screws securing cover. Oil the motor every 12 months with a good commercial grade of #20 non-detergent motor oil. Never over lubricate -- always wipe off excessive oil before exposing instruments to dirt-laden atmospheres.

CAUTION: Do not lubricate servo-drive mechanisms.

b. All drive pulleys contain shielded ball bearings that will not require relubrication. The servo motor, feedback pot and output sheave bearings are oil-impregnated and should also not require attention in the field.

4.5 MECHANICAL ADJUSTMENTS

It may be necessary to perform the following adjustments in the field when a visual inspection or recorder performance indicates. Refer to Figure 4-1 for the location of adjustment points.

4.5.1 Cable Tension

a. Adjustment of the X and Y drive cables may be necessary if the cables become loose or after component replacements that require the cables to be loosened. Tension of the drive cables should be tight enough to prevent cables from slipping off of their guide pulleys, but not tight enough to cause excessive friction or binding. Poor repeatability may be noted if a cable is too loose.

b. Since response characteristics of one axis can be affected by the cable tension of the other axis, the X and the Y cables should both be adjusted. To adjust cable tension, disassemble instrument as follows:

(1) Turn off power and disconnect all dangerous potentials from recorder.

(2) Remove two screws from each side of bottom cover and remove cover from chassis frame.

(3) From under side of chassis, remove three self-tapping screws securing one carriage end cover to front frame. Remove cover from chassis.

(4) Drive cabling systems are now exposed at both front and rear of recorder chassis; proceed with the following adjustment instructions.

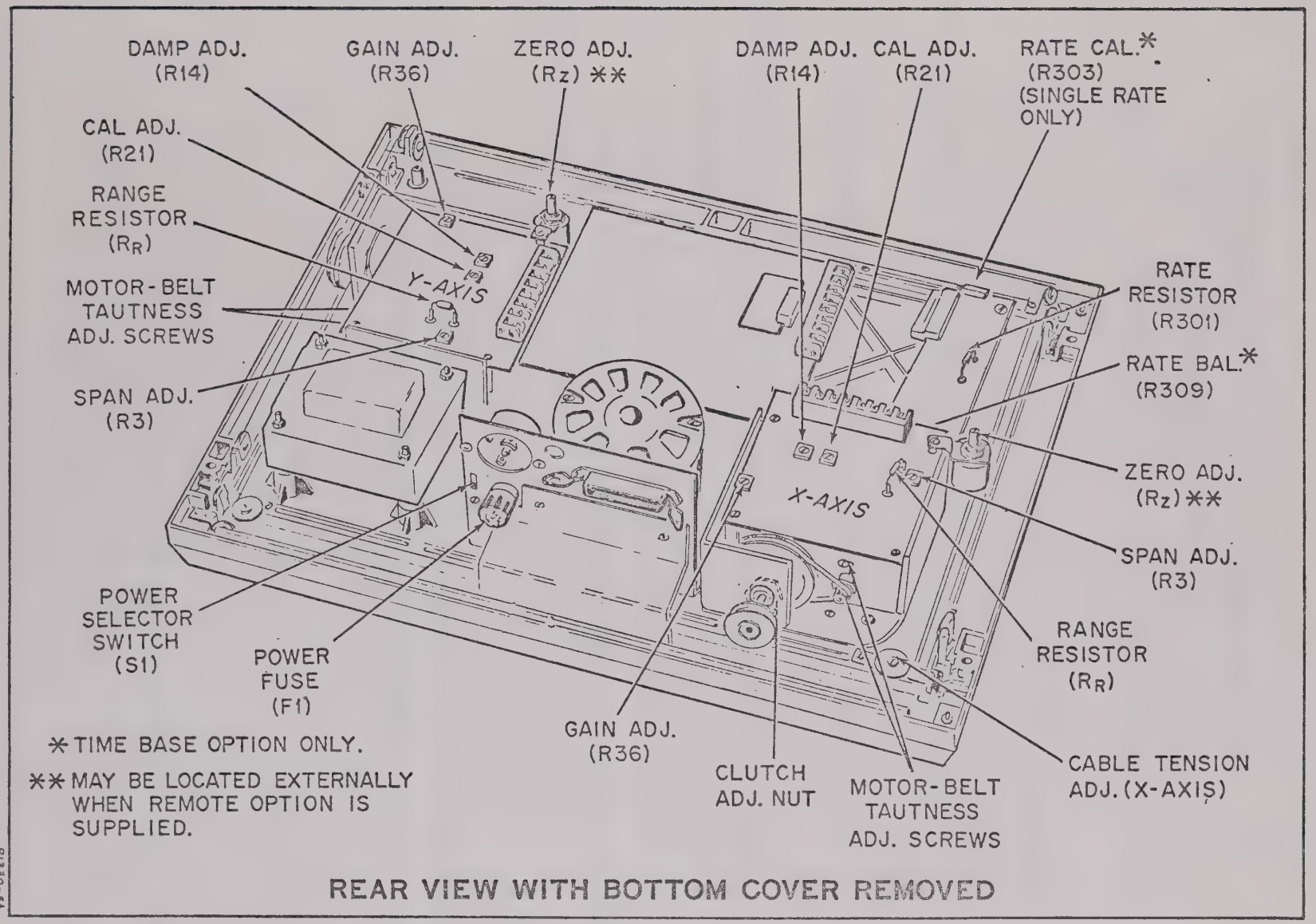


Fig. 4-1. Location of Service Adjustments.

NOTE: It is recommended that chassis frame be supported in a vertical position for servicing. A Maintenance Stand Set (P.N. 16771566-001) is available for this purpose.

c. X-AXIS CABLE:

(1) Secure chassis frame in vertical position, then manually move X-axis carriage bar to one end of its travel (zero or full scale).

(2) Locate X-axis drive cable at front of instrument where carriage end cover was removed.

(3) Hang 50-gram weight on X-axis cable midway between the two end pulleys. Cable should deflect from its normal position 1/4 inch (± 1/16") with proper tension.

(4) If tension is not within tolerance, locate X-axis adjustment pulley. This pulley is on component side of chassis in one corner of frame (see Figure 4-1).

(5) Loosen screw securing pulley to its slotted mounting bracket. Slide pulley in proper direction to achieve specified cable tension.

(6) Tighten pulley screw and then move X-axis carriage back and forth several times. Recheck tension measurement and repeat adjustment if necessary.

d. Y-AXIS CABLES:

(1) Secure chassis frame in vertical position, then manually move X-axis carriage bar to one end of its travel (zero or full scale).

(2) Locate Y-axis drive cable at front of instrument where carriage end cover was removed.

(3) Hang 50-gram weight on Y-axis cable midway between its two end supports. Cable should deflect from its normal position 3/8 inch (± 1/16") with proper tension.

(4) If tension is not within tolerance, locate tie post at one end of Y-axis cabling. This is a cable clamp and terminal assembly on the front side of chassis.

NOTE: Two cables are used on Y-axis drive but only one adjustment is required.

(5) Loosen 1/4" hex nut securing cable at tie post. Extend or retract end of cable enough to achieve specified cable tension.

(6) Tighten tie post nut and then move Y-axis writing head up and down carriage bar several times. Recheck tension measurement and repeat adjustment if necessary.

(7) Restore instrument to operation by reversing disassembly procedures.

4.5.2 Drive Belt Tension

a. Adjustment of belt tension may be necessary if components in a servo motor drive assembly have been replaced in the field, or if a belt has stretched after long periods of operation. If a drive belt is too loose, the axis servo system may tend to "hunt". If a belt is too tight, excess friction occurs and erratic servo response may result.

b. To adjust belt tension, turn off power and disconnect all dangerous potentials from recorder, remove bottom cover, and proceed with the following steps:

(1) Check belt tension at servo drive assembly. Belt should be tight enough for its teeth to snuggly mesh with teeth on the small motor pulley, but loose enough so that the belt can be easily moved from side-to-side on the teeth of the larger output pulley.

(2) If adjustment is necessary, loosen the two servo-motor mounting screws located directly above and below the motor shaft, as pointed out in Figure 4-1. Loosen the screws just enough to permit slight movement of the servo motor.

(3) To tighten belt, carefully move pulley and motor-shaft assembly away from the larger output pulley; to loosen belt, move assembly toward the output pulley.

CAUTION: Do not use tool or excessive force that could bend motor shaft.

(4) Once proper tension is obtained, tighten motor mounting screws and check recorder operation.

4.5.3 Clutch Adjustment

a. Field adjustment of a servo drive clutch may be required if components have been replaced in the drive system or if drive frictions change due to wear. Both X- and Y-axis clutches should be adjusted so that they slightly slip whenever the drive systems are stalled.

b. Clutch operation may be checked by observing the rotations of the motor shaft and the large belt-driven pulley at each servo drive assembly. To adjust a servo clutch, turn off power and disconnect all dangerous potentials from recorder, remove bottom cover, and proceed with the following steps:

(1) Disconnect external source voltages and short X and Y signal input terminals of recorder. Apply power and permit instrument to warm up.

(2) Adjust axis Zero control so that recording pen is forced to move beyond graph zero reference (suppressing zero) and system reaches a stalled condition.

NOTE: As system stalls, drive noise will increase for a few seconds until shutdown circuit is actuated; driving force and noise will then reduce abruptly.

(3) Observe clutch operation when system is first stalled prior to shutdown. If large belt-driven pulley stops completely, clutch is not slipping; if pulley is rotating relatively fast, clutch is slipping too much. Adjust as required.

NOTE: A 1" hex, clutch adjustment nut is located in front of large belt-driven pulley in each servo assembly. The X-axis nut is shown in Figure 4-1.

(4) Using suitable wrench, hold large pulley and turn nut clockwise until pulley stops when system is first stalled; then carefully turn nut counterclockwise until pulley slowly starts to rotate (2-5 RPM) each time system is stalled.

NOTE: Clutch slippage can only be determined when system first stalls. Use axis Zero control to alternately start and stall drive.

4.6 ELECTRICAL ADJUSTMENTS

a. Model XY-575 recorders will require little or no adjustment of internal electrical controls. For normal recording operations, only the X- and Y-axis zero controls must be set for each measurement application.

CAUTION: Do not attempt adjustment of other internal controls unless performing instrument calibration.

b. Basic recorders with internal zero adjustments will have a Zero Adjust pot (R_Z) attached to each servo amplifier PC board--as pointed out in Figure 4-1. These controls are screwdriver adjustments accessible through holes in the bottom cover of the instrument. When the remote zero option is supplied, these adjustments will be mounted externally by the user. The zero controls are 10-turn precision potentiometers that offer a minimum electrical zero-offset of ± 100% of the graphic scale.

NOTE: Refer to supplemental documentation for Control Module option.

4.6.1 Zero Offset

a. When a measured signal range is within the limits of the calibrated graph paper, zero may be adjusted to position the recording pen at the "0" points on the graph. If negative or both positive and negative signals are to be recorded, electrical zero may be shifted up-scale (elevated) from 0 to + 100% of the graphic spans. If the input signal range is greater than the upper limit of the graph, electrical zero may be shifted down-scale (suppressed) from 0 to -100% of the graphic spans.

b. ZERO ELEVATION: Electrical zero may be elevated by the following procedure:

(1) Remove analog source and connect shorting jumper across "high" and "low" axis input terminals. Apply power and permit instrument to warm up.

(2) Determine desired zero pen position on graph paper. Lower-end value of input signal range equals minimum amount of zero elevation required--disregarding negative sign of input signal voltage.

CAUTION: Signal input voltage must not exceed ± 15V DC, regardless of offset adjustment.

(3) Carefully rotate axis Zero Adjust R_Z until recording pen moves up-scale to point determined in step (2).

NOTE: If graphic calibrations are not directly proportional to desired range; calculate equivalent percentage point on graph grid.

(4) Remove shorting jumper and connect signal source to be measured. Instrument will now record analog inputs over the elevated range selected.

CAUTION: Once offset adjustment is made, do not disturb zero control setting.

c. ZERO SUPPRESSION: Electrical zero may be suppressed by the following procedure:

(1) Disconnect analog source from axis, apply power, and permit instrument to warm up.

(2) Using known-accurate voltage standard, apply input signal to recorder that equals low-end value of desired measurement range. Recording pen will deflect to equivalent position on graph span. If graphic calibrations are not directly proportional to desired range, calculate equivalent percentage point on graph grid.

CAUTION: Signal input voltage must not exceed ± 15V DC, regardless of offset adjustment.

(3) Carefully rotate axis Zero Adjust R_Z until recording pen moves down scale and comes to rest precisely on "0" reference line of graph grid.

NOTE: Graphic "0" now electrically represents low end of desired measurement range.

(4) Disconnect voltage standard from axis input and connect signal source to be measured. Instrument will now record analog inputs over suppressed range selected.

CAUTION: Once offset adjustment is made, do not distrub zero setting.

4.7 CHANGING SENSITIVITY OR RATE

a. In the basic fixed-range recorder, sensitivity is established for each axis by range resistor R_R. This is a precision plug-in component located on the servo amplifier PC board (Fig. 4-1). To change sensitivity, select R_R from the Amplifier Signal Range Table below and recalibrate as directed in paragraph 4.9c.

AMPLIFIER SIGNAL RANGE TABLE

STANDARD SENSITIVITIES		RESISTOR R_R ASSEMBLY	
English	Metric	Part No.	Ohms ±1%
100 mV/in	50 mV/cm	733B29-1-C	0 (Jumper)
10 mV/in	5 mV/cm	733B29-1-F	86.6 K
1 mV/in	.5 mV/cm	733B29-2-F	953 K
1 V/in	.5 V/cm	733B29-1-F	86.6 K *
10 V/in	5 V/cm	733B29-1-C	0 (Jumper) *

*Also change R1 to 1 Meg and add R45 (10K ±1%) across C1.

b. The sweep rate of the X-axis Time Base option in a basic recorder is determined by plug-in resistor R301. To change rate, select R301 from the Time Base Rate Table below and recalibrate as directed in paragraph 4.10.

TIME BASE RATE TABLE

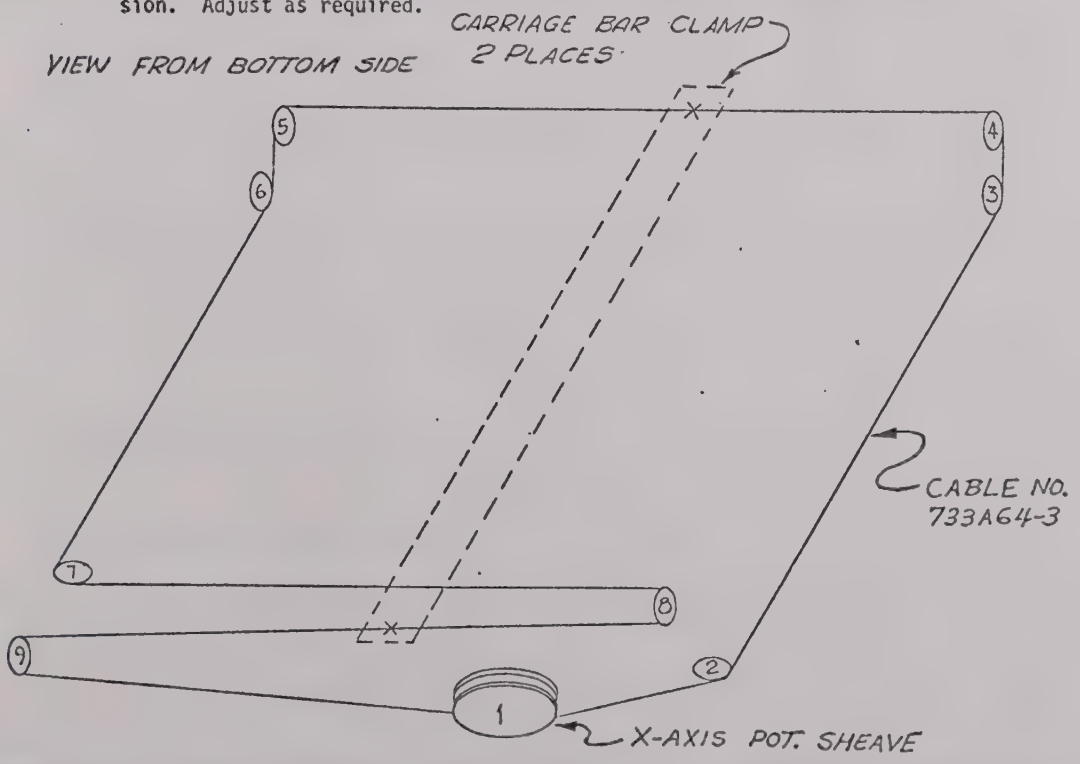
STANDARD SWEEP RATES		RESISTOR R301 ASSEMBLY	
English	Metric	Part No.	Ohms ±5%
.01 in/sec	.2 mm/sec	733B29-6-C	10 Meg
.05 in/sec	1 mm/sec	733B29-5-C	2 Meg
.1 in/sec	2 mm/sec	733B29-4-C	1 Meg
.5 in/sec	10 mm/sec	733B29-3-C	200 K
1 in/sec	20 mm/sec	733B29-2-C	100 K
2 in/sec	40 mm/sec	733B29-7-C	51 K

4.8 CABLE INSTALLATION

Two drive cables are employed to position the vertical recording system (Y-axis writing head assembly); while one drive cable moves the horizontal recording system (X-axis carriage assembly). To install new cables, refer to instructions in the stringing procedures on the following diagrams.

"X" Axis Stringing Procedure

1. Position recorder in stand, bottom side up. Pot sheave ("Y" axis) on the left hand side.
2. Rotate sheave ("X" axis) in a counterclockwise direction until pot stop is felt.
3. Pulley 2 should be assembled so that it will have full adjustment toward the right side of the recorder.
4. Tie a simple knot in one end of cable as close to the end as possible. Pass cable thru slot on the inside of the sheave, pull cable until the knot is against sheave. Wind complete turn plus a partial turn around the sheave in a counterclockwise direction with cable coming off the bottom and to pulley 2.
5. Continue stringing cable per diagram thru pulley 6. Tension must be kept on cable thru stringing operation to prevent cable from coming off of the sheave.
6. Cable must pass behind "Y" sheave to pulley 7. Continue thru 8 & 9.
7. Cable from pulley must pass behind cable between pulleys 7 & 8.
8. With the cable on the bottom side of sheave, holding end of cable, rotate "X" axis sheave in a clockwise direction until pot stop is felt. Wrap 1 complete wrap plus a partial turn, pass cable thru slot and around anchor screw. Tighten screw to retain cable and tension.
9. Check all pulleys for proper cable alignment. Proper cable tension can be obtained by changing position of pulley No. 2 toward the outside of the recorder.
10. Attach carriage bar with writing head assy. to cable using clamps on end block assy's. Adjust for zero. Carriage end blocks should contact mechanical stops before pot stops are felt.
11. With instrument vertical, move carriage back and forth a few times to insure proper carriage travel.
12. With the carriage at either zero or full scale, hang a 50 gram weight midway between pulleys 8 & 9. Cable should deflect 1/4"(±1/16") with the proper cable tension. Adjust until proper deflection can be measured.
13. Move carriage assembly back and forth a few times and remeasure cable tension. Adjust as required.



REF. 733B32
P1494

"Y" Axis Stringing Procedure

1. Position recorder in stand, bottom side up. "Y" axis sheave on the left hand side. "X" axis stringing should be completed.

2. With carriage assy. secured to "X" axis cable, position writing head assy. to the zero side of recorder. Rotate "Y" axis sheave in a clockwise direction until pot stop is felt.

3. Tie a simple knot in one end of cable P/N 733A64-1 (59.5" long) within ¼" from end. Thread cable thru hole in sheave putting cable in the outside annular ring, and the knot on the outside of sheave. *

4. Wrap one complete wrap plus a partial in a counterclockwise direction, with the cable coming off the top of the sheave.

5. Thread cable thru pulleys 7 & 8. Rotate instrument 180° in stand (top side up).

6. Thread cable between pulleys 9 & 11 and around pulley 10; between flat washers and thru hole in upper right-hand terminal post. Retain tension on cable. Rotate sheave in a counterclockwise direction until stop is felt. Tighten #6 nut on cable clamp to retain cable tension.

7. Tie a simple knot in one end of cable P/N 733A64-2 (58" long) within ¼" from end. Thread cable thru hole in sheave putting cable in the inside annular groove and knot outside of sheave. *

8. Wrap 1 complete plus a partial turn around sheave so that cable is coming off the top of the sheave and to pulleys 2 & 3, retain tension on cable.

9. Rotate instrument 180° in turn-over stand (top side up).

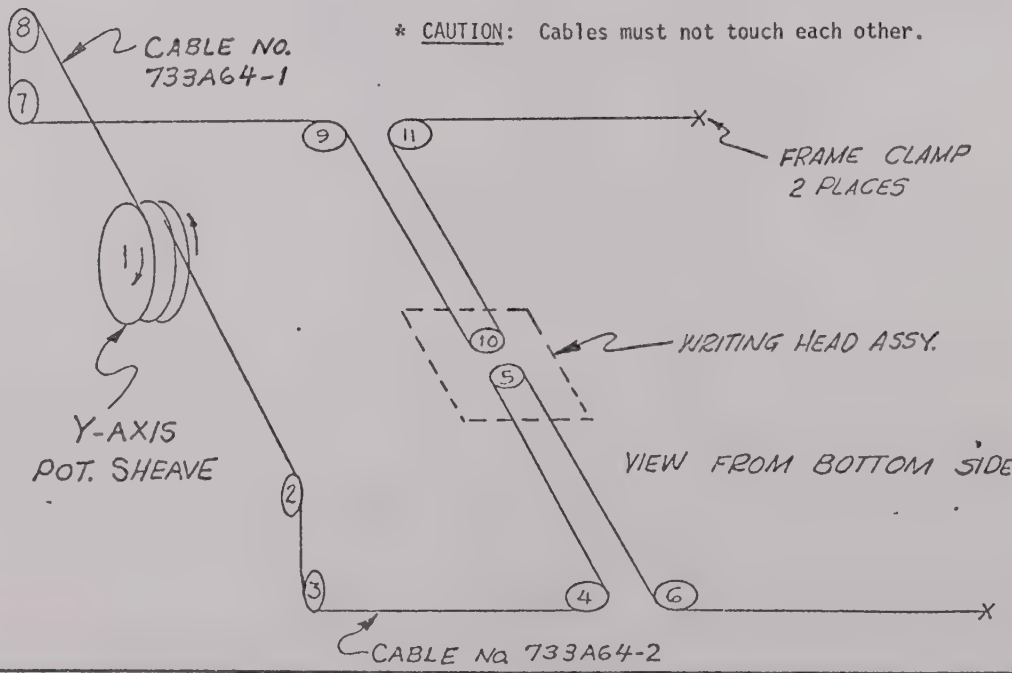
10. Thread cable between pulleys 4 & 6 and around pulley 5. Between flat washers and thru hole in lower right-hand terminal post. Tighten #6 nut to retain cable with enough tension to keep cable wrapped around sheave.

11. Check all pulleys for proper cable alignment. Change if necessary. Proper cable tension can be adjusted by loosening either hex nut.

12. With instrument vertical, move carriage assy. back and forth a few times to equalize cables. Leave carriage at either extreme, hang a 50 gram weight between pulleys 3 & 4. Cable will deflect 3/8(±1/16) with proper cable tension. Adjust until proper deflection can be measured.

13. Move writing head assy. up and down carriage bar a few times and remeasure cable tension. Adjust as required.

* CAUTION: Cables must not touch each other.



4.9 SIGNAL AMPLIFIER CALIBRATION

a. Both X- and Y-axis calibration can be checked by a direct comparison with a known-accurate standard. The validity of such a test, however, depends upon the accuracy of the reference source--which should be considerably better than accuracy requirements of the recorder.

b. To check instrument calibration, zero axis pen and then apply signal from standard which is equivalent to the basic input sensitivity specified for the recording axis (or a multiple thereof). The recording pen should register the input value on the graph grid within an accuracy tolerance of ±0.25% of full graph scale.

c. If deflection sensitivity is not within desired accuracy limits, remove bottom cover from instrument and carefully adjust SPAN pot R3. This screwdriver adjustment is located on the servo amplifier PC board of each axis (see Figure 4-1). If recorder sensitivity is 100 mV/in. (or 50 mV/cm), set SPAN R3 fully clockwise and then carefully adjust CAL. R21 for proper pen deflection.

> NOTE: For instruments with Control Panel option, place axis RANGE Switch in "100 mV/in" (or "50 mV/CM") position and VAR-CAL Switch in "CAL" position; set SPAN R3 fully clockwise and carefully adjust CAL R21 for proper pen deflection.

4.10 TIME BASE CALIBRATION

To calibrate the optional X-axis time base circuit, permit instrument to warm up for at least ten minutes and then proceed with the following steps:

(1) Place Sweep/Reset Switch in its "RESET" position. Short input by connecting jumper from junction of R301 and C301 to signal common on Time Base board PCB3.

> NOTE: For instruments with Control Panel option, place TIME BASE Switch in it's slowest rate position.

(2) Connect positive lead of voltmeter to unshorted end of capacitor C301 and negative lead to signal common on PCB3.

(3) If voltmeter reading is not between +.001 and +.005 volts, carefully adjust BAL. R309 until proper value is obtained. See Figure 4-1 for location of R309 trim pot.

> NOTE: When Control Panel option is supplied, see supplemental illustration in Appendix for location of R309.

(4) Disconnect voltmeter and shorting jumper. Determine sweep rate provided with instrument (see Data Sheet).

> NOTE: For Control Panel option, set RANGE Switch to "TB" and TIME BASE Switch to its fastest rate position.

(5) Connect crystal-controlled time marker generator to Y-axis signal input. Adjust generator output for properly timed pulses that produce approximately 1/2 inch Y-axis deflection.

NOTE: If generator is not available, an accurate stop watch may be used to time a specific sweep trace.

(6) Place Sweep/Reset Switch in its "SWEEP" position and observe time marker spacing along X-axis trace. Rate accuracy should be within 1% over full-scale deflection.

NOTE: For Control Panel option, pulse spacing should be within ±0.5% over 14 inches of travel (36 cm). All other slower rates should be within a 1% accuracy.

(7) If sweep rate is not within acceptable tolerance, carefully adjust RATE CAL R303 until proper timing is obtained. See Figure 4-1 for location of R303 trim pot.

NOTE: For Control Panel option, adjust RATE CAL R315. See supplemental illustration in Appendix for location of this trim pot.

(8) Repeat steps 1, 2 and 3, disconnect voltmeter and shorting jumper, and recheck rate accuracy.

4.11 TROUBLESHOOTING

a. Complete electrical wiring diagrams and schematics are supplied in this section of the manual. They provide all of the necessary information for tracing wiring and troubleshooting the electronic assemblies.

b. If trouble is indicated in one of the electrical measuring systems, the most logical troubleshooting approach is to isolate the fault to a functional area--such as: input wiring, the servo amplifier board, the feedback pot, or the servo motor. Voltage and current measurements, continuity checks, and DC resistance measurements may be necessary to pin-point the source of trouble.

CAUTION: Always turn off power before making DC continuity checks or resistance measurements.

4.12 SHUTDOWN

a. If the instrument is to remain inactive for more than 30 days, the ink cartridge should be removed and the pen tip shield placed over the pen tip. Turn off power and protect front of instrument with a suitable dust cover.

b. If the recorder is to be shut down for a brief period of time but may undergo handling vibrations, the following precautions should be taken:

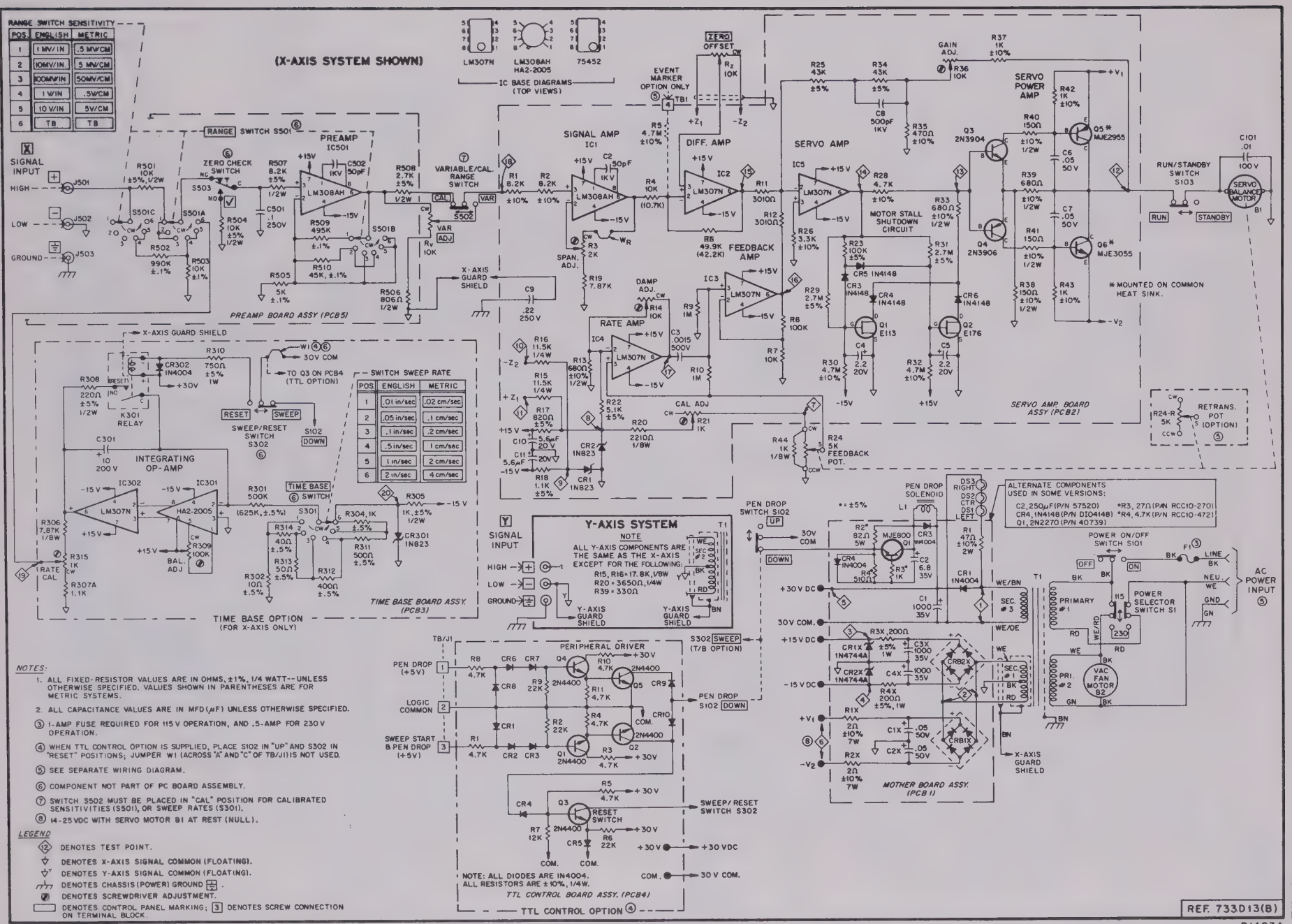
NOTE: Refer to supplements with this manual for shutdown procedures regarding optional systems.

(1) Disconnect power source and all signal leads.

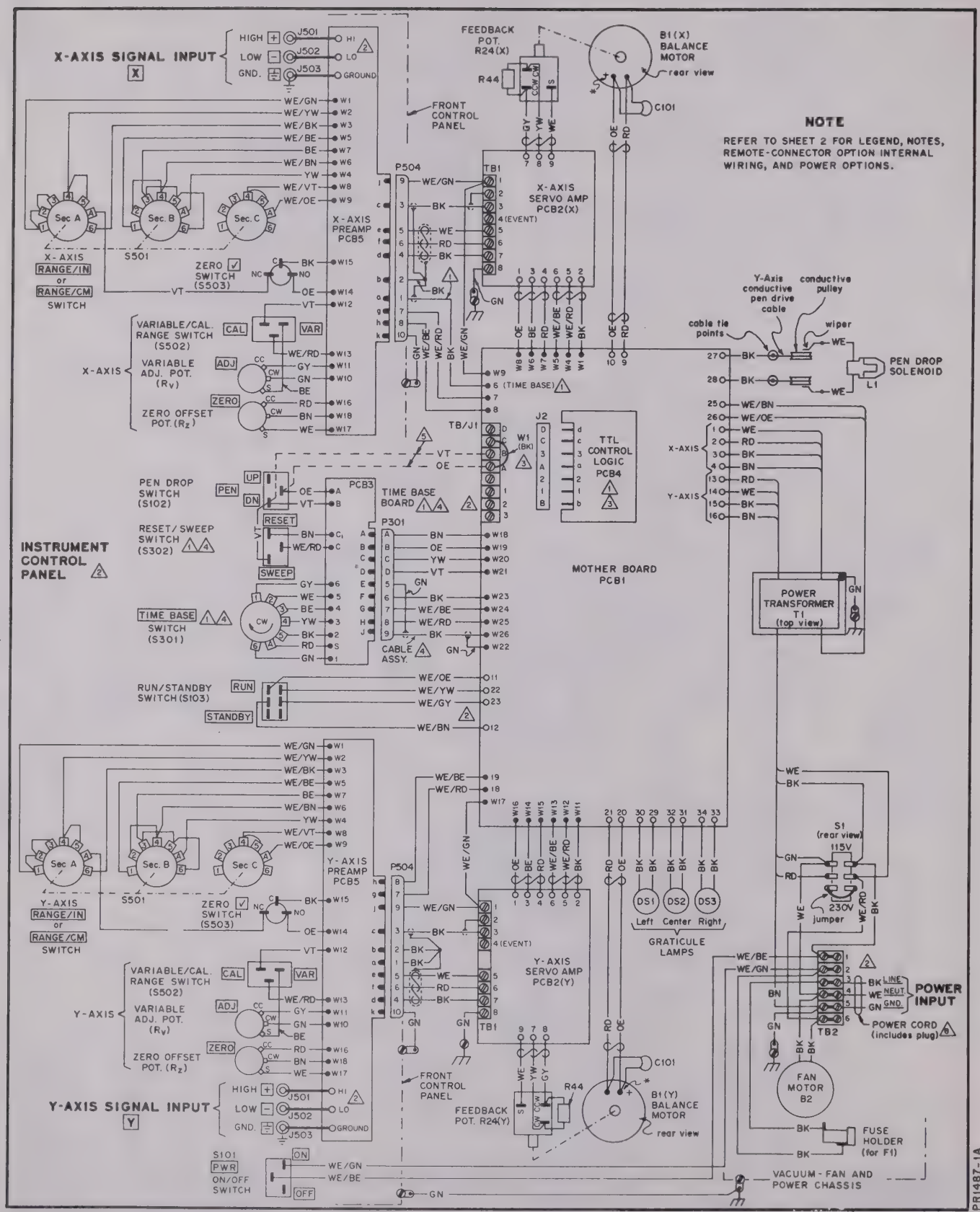
(2) Place shield over pen tip of ink cartridge.

(3) Tape carriage and writing head to instrument to restrict movement.

CAUTION: If instrument is to be transported for a long distance, follow factory packing procedures.


RANGE SWITCH SENSITIVITY
(X-AXIS SYSTEM SHOWN)
IC BASE DIAGRAMS (TOP VIEWS)
LM307N
LM308AH HA2-2005
75452
SIGNAL INPUT
PREAMP BOARD ASSY (PCB5)
SERVO AMP BOARD ASSY (PCB2)
TIME BASE BOARD ASSY. (PCB3)
TIME BASE OPTION (FOR X-AXIS ONLY)
Y-AXIS SYSTEM
MOTHER BOARD ASSY. (PCB1)
TTL CONTROL BOARD ASSY. (PCB4)
TTL CONTROL OPTION
MOTOR STALL SHUTDOWN CIRCUIT
* MOUNTED ON COMMON HEAT SINK.
ALTERNATE COMPONENTS USED IN SOME VERSIONS:
C2, 250μF (P/N 57520) *R3, 27Ω (P/N RCC10-270)
CR4, 1N4148 (P/N DIO4148) *R4, 4.7K (P/N RCC10-472)
Q1, 2N2270 (P/N 40739)
NOTES:
1. ALL FIXED-RESISTOR VALUES ARE IN OHMS, ±1%, 1/4 WATT--UNLESS OTHERWISE SPECIFIED. VALUES SHOWN IN PARENTHESES ARE FOR METRIC SYSTEMS.
2. ALL CAPACITANCE VALUES ARE IN MFD (μF) UNLESS OTHERWISE SPECIFIED.
3. 1-AMP FUSE REQUIRED FOR 115 V OPERATION, AND .5-AMP FOR 230 V OPERATION.
4. WHEN TTL CONTROL OPTION IS SUPPLIED, PLACE S102 IN "UP" AND S302 IN "RESET" POSITIONS; JUMPER W1 (ACROSS "A" AND "C" OF TB/J1) IS NOT USED.
5. SEE SEPARATE WIRING DIAGRAM.
6. COMPONENT NOT PART OF PC BOARD ASSEMBLY.
7. SWITCH S502 MUST BE PLACED IN "CAL" POSITION FOR CALIBRATED SENSITIVITIES (S501), OR SWEEP RATES (S301).
8. 14-25 VDC WITH SERVO MOTOR B1 AT REST (NULL).
LEGEND
12 DENOTES TEST POINT.
DENOTES X-AXIS SIGNAL COMMON (FLOATING).
DENOTES Y-AXIS SIGNAL COMMON (FLOATING).
DENOTES CHASSIS (POWER) GROUND.
DENOTES SCREWDRIVER ADJUSTMENT.
DENOTES CONTROL PANEL MARKING; 3 DENOTES SCREW CONNECTION ON TERMINAL BLOCK.
REF. 733D13(B)
P1493A

Schematic Diagram for Model XY575 Lab Recorder.



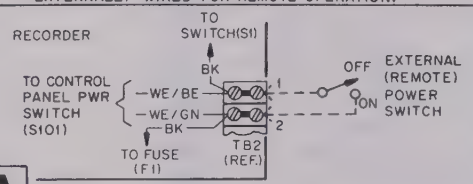
Wiring Diagram for Model XY575 Lab Recorder (Sheet 1).

LEGEND

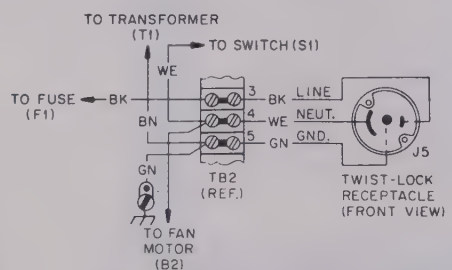
- SIGNAL INPUT JACK ON CONTROL PANEL.
- SCREW-TYPE WIRE CONNECTION ON TERMINAL BLOCK.
- TYPICAL FOR RECEPTACLE-CONTACT IDENTIFICATION.
- TYPICAL FOR PLUG-CONTACT IDENTIFICATION.
- CAL — BOXED NOMENCLATURE INDICATES CONTROL PANEL MARKING.
- MTG SCREW, POWER CHASSIS GROUND.
- WIRES TWISTED TOGETHER.
- WIRES WITH SHIELDING.
- GROUNDED END OF SHIELDED WIRES.
- SOLDERED WIRE-CONNECTION POINTS.
- REMOVABLE WIRE-CONNECTION POINTS.
- REPRESENTS MECHANICAL LINKAGE.
- —BK— WIRING COLOR CODE.
- * POSITIVE (+) TERMINAL MAY BE MARKED WITH "1" OR RED DOT.

NOTES

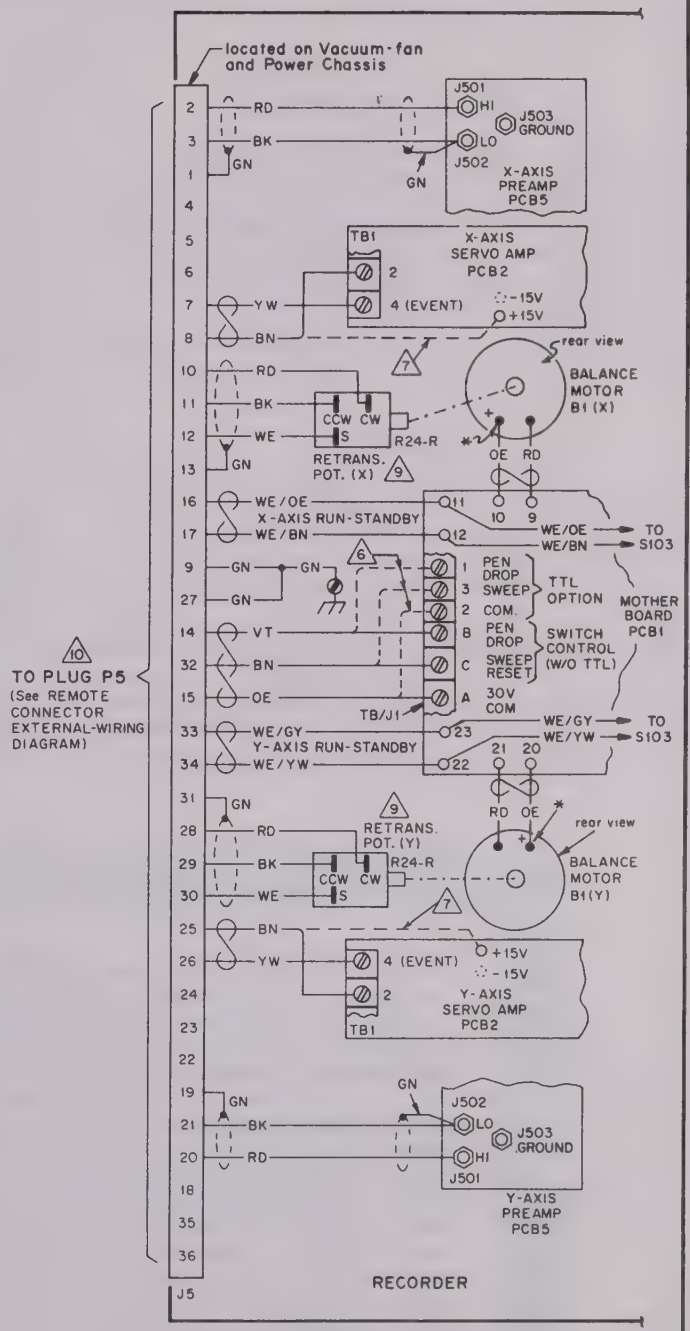
1. OPTION. REFER TO DATA SHEET.
2. WHEN REMOTE-CONNECTOR OPTION SUPPLIED, SEE VIEW C (SHEET 2) FOR INTERNAL WIRING. VIEW A SHOWS PROPER CONNECTION POINTS FOR WIRING A REMOTE POWER-SWITCH.
3. WHEN SWEEP-RESET OPTION IS CONTROLLED BY EXTERNAL REMOTE SWITCH OR BY TTL LOGIC, JUMPER "W1" NOT REQUIRED.
4. REQUIRED FOR TIME-BASE OPTION ONLY.
5. ALTERNATE WIRE ROUTING (- - -) APPLIES WHEN TIME-BASE OPTION IS NOT SUPPLIED.
6. WHEN TTL CONTROL OPTION IS SUPPLIED, REMOTE CONNECTOR WIRES ARE RE-ROUTED AS INDICATED BY DASH (- - -) LINES.
7. ALTERNATE WIRE ROUTING (- - -) REQUIRED FOR SWITCH TYPE EVENT ACTUATION ONLY (FOR VOLTAGE-TYPE, WIRE CONNECTS TO TB1-2). SEE DATA SHEET FOR TYPE SUPPLIED.
8. SEE VIEW B FOR INTERNAL WIRING WHEN OPTIONAL POWER CORD WITH TWIST-LOCK DISCONNECT SUPPLIED.
9. RETRANSMITTING POT., WHEN ORDERED, IS SUPPLIED WITH FEEDBACK POT. AS ONE DUAL-POT. ASSY. (SEE SHEET 1 FOR FEEDBACK POT. CONNECTIONS).
10. WHEN REMOTE SWEEP-RESET OPTION IS INTERNALLY WIRED TO TB/J1-A & -C, JUMPER IS PLACED ACROSS CONTACTS 15 AND 32 OF P5. JUMPER MUST BE REMOVED WHEN P5 IS EXTERNALLY WIRED FOR REMOTE OPERATION.



A REMOTE POWER-SWITCH CONNECTION POINTS



B RECORDER WIRING TO OPTIONAL POWER INTERLOCK CONNECTOR (1)



NOTE
FOR EXTERNAL POWER SWITCH CONNECTIONS, SEE VIEW A.

C RECORDER WIRING TO OPTIONAL REMOTE CONTROL CONNECTOR (1)

PR1487-2A

Wiring Diagram for Model XY575 Lab Recorder (Sheet 2).

ESTERLINE ANGUS INSTRUMENTATION SERVICES

TECHNICAL ASSISTANCE

Knowledgeable teams of Esterline Angus Application Engineers, Sales Engineers, and Service Engineers are always available for consultation regarding your equipment needs. When writing a Sales Office for technical assistance, be sure to include a complete description of your specific problem and both model and serial numbers of each instrument involved. Address all correspondence to your nearest Esterline Angus Sales Office (see office listing or consult local directory).

FIELD SERVICE

Esterline Angus affords the instrument purchaser an outstanding network of factory-trained Service Engineers. These individuals are highly qualified to maintain, repair, or modify instrumentation at any field installation. Contact your nearest Esterline Angus Sales Office for prompt field service (see office listing or consult local directory). Periodic Service Agreements are also available for instrument purchasers by contacting the Esterline Angus factory. Address all requests to: Service Manager, Esterline Angus Instrument Corp., Box 24000, Indianapolis, Indiana 46224.

ORDERING PARTS

When spare or replacement parts are required for an instrument, contact your nearest Esterline Angus Sales Office (see office listing or consult local directory). Furnish this authorized representative with a complete description of the part, its part number, and both model and serial numbers of the associated instrument. If all information is correctly supplied, Esterline Angus will be able to fill parts orders promptly.

RETURNING INSTRUMENTS

Should it become necessary to return an instrument to the factory, forward a purchase order or letter of explanation to: Esterline Angus Instrument Corp., Box 24000, Indianapolis, Indiana 46224. Follow instrument shutdown procedures given in the instruction manual. Pack the unit safely, mark "HANDLE WITH CARE", fully insure, and ship prepaid to: Esterline Angus Instrument Corp., 1201 Main Street, Speedway, Indiana 46224. Make sure that you include your name and return address.

WARRANTY—Only the products manufactured by the Seller and sold hereunder are warranted as free from defects of materials and workmanship and in conformance with specifications. There are no other oral, statutory, or implied warranties. Seller's obligation hereunder shall be and is limited to servicing or replacing f.o.b. its plant in Indianapolis, Indiana or such other point as Seller may designate, or refunding the purchase price of any such product manufactured by the Seller which proves to be defective in material or workmanship or which fails to conform to specifications therefor, provided that (1) written notice of such defect or failure is received by Seller from Purchaser within one year after the date of shipment of such products manufactured by the Seller, and (2) such defects, in the opinion of Seller, shall not have arisen from improper use. The absence of such written notice of defect, or failure, or lack of conformance to specifications within the specified time shall constitute a waiver of any claim. Seller may, after receipt of notice, require purchaser to send said products, transportation prepaid, to Seller for its examination and inspection.

SECTION 5 — PARTS LIST

5.1 INTRODUCTION

a. This section of the instruction manual includes complete listings of all replaceable parts for the Model XY575 Lab recorder, as well as those parts included in such options as Time Base and TTL Control Logic. Each parts-list table covers a major assembly or group of related components used in the construction of the instrument.

b. All parts are identified by either electrical or mechanical nomenclature in the Description column of each parts table. This column employs an indention system so that the user can determine the precise parts included in each assembly. Any assembly that is comprised of field replacement parts will have those parts indented directly below the assembly.

c. The number represented in the Qty. column of each parts table refers to the quantity used in the assembly covered under the title of each particular list. This quantity, therefore, does not necessarily reflect the total number used in the entire instrument. The term "A/R" in the quantity column listing is an abbreviation for "As Required". This term is used generally on selectable items and optional parts or for commercially-available raw materials.

5.2 LOCATING A PART NUMBER

To find a specific part number in this section of the manual, first determine the major assembly table in which the part would be found by referring to the index in paragraph 5-3; then, search down the Description column in the table until the correct description is located. Opposite that description, you will find the replacement part number. Recording supplies and accessory items will be found in the Main Assembly parts list (Table 5-1).

5.3 ORDERING INFORMATION

All parts and recording supplies are available through Esterline Angus Sales Offices. To insure prompt delivery and receipt of parts that are compatible with your specific instrument, always mention the recorder Model Number and Serial Number--as well as the part number and description of all items requested.

INDEX TO REPLACEMENT PARTS TABLES

Subject	Table
Main Assembly	5-1
Control Panel Assembly	5-2
Vacuum Fan and Power Assembly	5-3
Mother Board Assembly	5-4
Servo Drive Assembly	5-5
Servo Amplifier PC Board Assembly	5-6
Time Base PC Board Assembly (Option)	5-7
Control Logic PC Board Assembly (Option)	5-8

TABLE 5-1. MAIN ASSEMBLY.

Ref. No.	Part Number	Description	Qty.
--	733R3-*	Model XY575 Recorder with Control Panel (Complete)	1
1	733R2	.Frame, Chassis	1
2	(Table 5-2)	.Control Panel Assy.θ	1
3	733D9	.Cover, Panel Assy.	1
4	NX90606	.Screw, Cover Mtg. (6-32 x 3/8 Binding Head)	4
5		(Not Used)	
6	(Table 5-3)	.Vacuum Fan and Power Assy.	1
7	733C4	.End-Cover, Carriage	2
8	733B15	.Carriage Block Assy. (Complete)	2
--	733B3	..End, Block	1
--	733A10	..Pulley, Carriage	2
--	733A30	..Pulley Assy. (1/2")	2
--	733A68	..Roller-Spindle	2
9	733B8	.Bar, Carriage	1
10	733D3	.Platen, Writing (Standard)	1 A/R
10	733D4	.Platen, Writing (Optional) A3 Size Paper Only	1 A/R
11	733B7	.Guide, Platen	2
12		(Not Used)	
13	733C10 ∇	.Writing Head Assy. (Complete)	1
--	733D2	..Housing, Writing-Head	1
--	12581	..Washer (No. 1, Flat)	3
--	733B10	..Collector, Electrical	2
--	HX30781-3	..Screw, Mtg. (4-40 x 1/4 Flat Head)	2
--	733A11	..Pulley, Conducting	2
--	733A5	..Spring, Pen	1
--	733C2	..Holder, Pen	1
--	733B1	..Pushrod, Solenoid	1
--	733A24	..Spring, Solenoid	1
--	ND40140-1	..Ring, Retaining	1
K1	733A27	..Solenoid, Pen Drop (12V)	1
--	733B13	..End-Cap, Housing	1
--	733A12	..Washer, Insulation	2
--	733A23	..Pin, Pivot	2
14	16774972-111†	.Pen and Ink-Cartridge Assy. (6-Pack, Red)	1
15		(Not Used)	
15	733D1-2	.Cover, Bottom	1
16	NX1008	.Washer (No. 8 Flat)	4
17	ND40213-54	.Screw (8-32 x 1 1/2 Binding Head)	4
18	NX2108	.Nut (No. 8-32)	4
19	733B36-4	.Screw (6-10 x 1/2 Pan Head Hi-Riser Type B Self Tap)	8
20	NU832B11E	.Nut, Tinnerman	4
21	(Table 5-4)	.Mother Board Assy.; PCB1	1

TABLE 5-1. MAIN ASSEMBLY (Continued)

Ref. No.	Part Number	Description	Qty.
22	(Table 5-5)	.Servo Drive Assy. (X and Y Axes)	2
23	(Table 5-6)	.Servo Amplifier PC Board; PCB2 (X and Y Axes)	2
24	HX33002	.Grommet, Lamp	3
25	LIT22	.Lamp, Graticule (DS1-DS3)	3
26	733B4	.Bracket, L.H. Lower Pulley	1
27	733B5	.Bracket. L.H. Upper Pulley	1
28	733A6	.Bracket, R.H. Lower Pulley	1
29	733A17	.Bracket, R.H. Upper Pulley	1
30	733A50	.Washer, Pulley (E.A. Spl.)	12
31	733A31	.Pulley Assy. (3/4")	11
32	733B37-1	.Screw (4-10 x 3/8 Flat Head Hi-Riser Type B Self Tap)	16
33	733B36-1	.Screw (4-10 x 1/4 Pan Head Hi-Riser Type B Self Tap)	4
34	733A7	.Cable Clamp & Terminal (Y Axis)	2
35	NX2111	.Nut (10-32 Hex)	2
36	NX1010	.Washer (No. 10 Plain Flat)	2
37	NX1006	.Washer (No. 6 Plain Flat)	2
38	733A58	.Nut, R.H. Stop (Hex)	2
39	733D6	.Transformer, Power; 115V/230V (T1)	1
40	10348	.Spacer, Transformer Mtg.	4
41	733B36-2	.Screw (4-10 x 1/2 Pan Head Hi-Riser Type B Self Tap)	6
42	NX90408	.Screw (4-32 x 1/2 Binding Head)	10
43	733B36-5	.Screw 6-10 x 3/4 Pan Head Hi-Riser Type B Self Tap)	14
44	733A64-1	.Cable, 58-inch Wire Drive (Y-Axis)	1
45	733A64-2	.Cable, 59.5-inch Wire Drive (Y-Axis)	1
46	733A64-3	.Cable, 122-inch Wire Drive (X-Axis)	1
47	STR8C101B	.Screw (8-32 x 5/8 Pan Head Type B Self Tap)	4
48	733A59	.Label, Patent	1
49		(Not Used)	
50		(Not Used)	
51	(Table 5-8)	.TTL Logic PC Board Assy.; PCB4 (Option)	1 A/R
52	733A30	.Pulley Assy. (1/2")	1
53	733A49	.Spacer, Pulley	2
54	SP1908	.Washer, Lock (No. 8)	4
55	733B36-3	.Screw (6-10 x 3/8 Pan Head Hi-Riser Type B Self Tap)	9
56	733A26	.Nameplate (Logo)	1
57	733A26-1	.Strip (Blank, solid black)	1
58	733A51	.Bumper, Carriage Stop	2
59	NX50208	.Screw (2-56 x 3/8 Fillister Head)	2
60	11040	.Spacer	2
61	NX2002	.Nut, Hex (2-56)	2
62	01501	.Tape, Foam (19")	1
63	D256B9A	.Screw (2-56 x 9/16 Fillister Head)	2
64	733A1	.Clamp, Cable (X-Axis)	2
65	733A54	.Fastener, Cable	2

TABLE 5-1. MAIN ASSEMBLY (Continued)

Ref. No.	Part Number	Description	Qty.
66	733A55	.Pad, Bearing	1
67	Q440H3B3E	.Setscrew (4-40 x 3/16 Flat Point)	2
68	733A57	.Bumper, Carriage Stop	2
69	733A52	.Decal, Connection	1
70	8935G	.Cord, Attached Power	1
70	45068*	.Cable Assy., Interlock Power (Option)	1 A/R
F1	14359-1	.Fuse (1A, 250V Slo-Blo) (for 115V operation)	1 A/R
F1	FAG2-.5	.Fuse (.5A, 250V Slo-Blo) (for 230V operation)	1 A/R
71	43097	.Decal, Serial Number (Blank, Specify Number)	1
72	16765280-225	.Screw (4-40 x 7/16 Flat Head)	4
73	16103100-001	.Nut (4-40)	4
74	SP1904	.Washer, "L"	4
75	733B45	.Impeller Cover	1
76	NX90604	.Screw (6-32 x 1/4 Binding Head)	2
P5†	(Table 5-3)	Plug, Remote Connector (Option)	1 A/R
--	16800046-001	Graph Paper, 100-sheet Box (11" x 17", inch grid)	1 A/R
--	16800543-001	Graph Paper, 100-sheet Box (11" x 17", cm grid)	1 A/R
--	M733-L	Instruction Manual	1
--	16771566-001	Stand Set, Maintenance (Servicing option)	1 A/R
--	733C27	Mask, Writing Platen (Option)	1 A/R

* Refer to instrument Data Sheet for specific part number supplied.

† Supplied with Accessories.

∇ To replace Writing Head Assembly, order field replacement kit #733B43K. Kit contains Writing Head Assy.(#733C10), Bearing Pad (#733A55), and Setscrews (#Q440H3B3E).

θ To replace optional External Input Signal Cable Assy., order part number 733C26.

TABLE 5-2. CONTROL PANEL ASSEMBLY

Ref. No.	Part Number	Description	Qty.
--	733D7-†	Control Panel Assembly (Complete)	1
1	733D8	.Panel Assy. (Less Parts)	1
2	733C23-1	.Decal, Panel (Metric)	1 A/R
2	733C23-2*	.Decal, Panel (Metric W/Time Base)	1 A/R
2	733C23-3*	.Decal, Panel (English W/Time Base)	1 A/R
2	733C23-4	.Decal, Panel (English)	1 A/R
S503	SWB11	.Switch, Pushbutton (Zero ✓)	2
R_Z,R_V	POT85	.Potentiometer; 10K (Zero/Var. Range ADJ.)	4
S502	SWS4	.Switch, Slide (Range VAR/CAL) SPDT	2
S501	733A45	.Switch, Rotary Multirange (RANGE)	2
S101	51166	.Switch, Slide (POWER ON/OFF)SPST	1
S301	733A46*	.Switch, Rotary Multirate (Time Base)	1 A/R
3	DAL19	.Knob, Control	6 or 7*
S102	51166	.Switch, Slide (PEN UP/DOWN) SPST	1
S302	51166*	.Switch, Slide (RESET/SWEEP) SPST	1 A/R
S103	SWS1	.Switch, Slide (RUN/STANDBY) DPDT	1
4	ND40210-5	.Screw, Switch Mtg. (4-40 x 1/4 Flat Head)	10 or 12*
5	NX2004	.Nut, Hex Mtg. (4-36)	8 or 10*
6	SP1904	.Washer, Lock (No. 4)	8 or 10*
PCB3	(Table 5-7)*	.Time Base PC Board Assy.	1 A/R
7		(Not Used)	
8	ND40210-10	.Screw, Mtg. (6-32 x 1/4 Flat Head)	6
9	NX90605*	.Screw, Mtg. (6-32 x 5/16 Binding Head)	2
10	SP1906	.Washer, Lock (No. 6)	4 or 6*
J501,J502, J503	1680568-001	.Post, Jack (Signal Input)	6
11	16100495-102	.Cap, Post Insulating (Red)	2
12	16100495-103	.Cap, Post Insulating (White)	2
13	16100495-105	.Cap, Post Insulating (Blue)	2
14	16750409-028	.Nut, Nex Mtg. (1/4-32)	12
PCB5	733B26-2	.PC Board Assembly, Preamp	2
15	733B26-1	..PC Board (Less Parts)	1
C501	CMM39	..Capacitor, Molded Mylar; 0.1µF	1
C502	40763-3	..Capacitor, Disc; 50pF	1
IC501	OPA308A	..Op-Amp, IC (LM308AH)	1
R501,R504	RCC1-103	..Resistor, C.C.; 10K, ±5%, 1/2W	2
R502	RWP27A990000	..Resistor, W.P.; 990K, ±0.1%, 1/4W	1
R503	RWP27P100000	..Resistor, W.P.; 10K, ±0.1%, 1/4W	1
R505	RWP27Q500000	..Resistor, W.P.; 5K, ±0.1%, 1/4W	1
R506	RWP2R806000	..Resistor, W.P.; 806Ω, 1%, 1/2W	1
R507	RCC1-822	..Resistor, C.C.; 8.2K, ±5%, 1/2W	1
R508	RCC1-272	..Resistor, C.C.; 2.7K, ±5%, 1/2W	1
R509	RWP27A495000	..Resistor, W.P.; 495K, ±0.1%, 1/4W	1
R510	RWP27P450000	..Resistor, W.P.; 45K, ±0.1%, 1/4W	1
16	733A35-1	.Spacer, Board Mounting (Upper)	4 or 6*
17	733A42-2	.Spacer, Board Mounting (Lower)	4
--	0791	.Wire, WE/OE }	12"
--	0793	.Wire, WE/BN }	12"
--	0790	.Wire, WE/YW } RUN-STANDBY Switch	9"
--	0789	.Wire, WE/GY }	9"
--	0788	.Wire, WE/GN }	14"
--	0787	.Wire, WE/BE } POWER ON-OFF Switch	14"
--	KPC21F	.Connector, Wire (Female)	4
--	0771**	.Wire, OE	14" A/R
--	0773**	.Wire, VT	14" A/R
--	ND40034-2	.Lug, Wire Terminal	2 or 4**
18	16756585-004	.Washer, Zero ✓ Switch Mtg. (1/4" Dia.)	4

† Refer to Instrument Data Sheet for specific assembly number supplied.
* Required for multirate Time Base option only.
** Required when Time Base option not supplied.

TABLE 5-3. VACUUM FAN AND POWER ASSEMBLY

Ref. No.	Part Number	Description	Qty.
--	733C6-*	Vacuum Fan and Power Assembly ■	1
1	733C8-1	.Bracket, Mounting	1
B2	733A56▽	.Motor, Vacuum Fan	1
2	733B44▲	.Fan Impeller Assy.(with setscrew)	1
--	13048	.Spacer, Impeller Mtg.	2
--	SP1908	.Washer, Impeller Mtg. (No. 8)	2
3	ND40213-54	.Screw (8-32 x 2 1/4 Round Head)	2
4	57534	.Switch, Power-Input Select	1
5	NX2106	.Nut (6-32 Hex)	2
6	SP1906	.Washer (No. 6)	2
7	ND40210-10	.Screw (6-32 x 3/16 Binding Head)	2
TB2	41040-6	.Terminal Block (6-Post)	1
--	41041-9	.Marker, Terminal Block	1
8	NX90606	.Screw (6-32 x 3/8 Binding Head)	1
--	ND40036-2	.Lug, Solder	1
9	43138-1	.Tie, Cable	2
10	14358	.Holder, Fuse**	1
--	††	.Wire, 22-Gage	A/R
11	43073	.Strain Relief** (for Power Cord)	1
W3	41039	.Jumper	1
11B	ND40034-2	.Terminal, Crimp	A/R
		ASSEMBLY OPTIONS*	
--	733C6-6	.Assy. (W/O Power Cord or Remote Option)	--
--	733C6-2	.Assy. (W/Remote Connector)	--
J5	KBR3-40360	..Remote Connector (Recptacle)	1 A/R
12	NX90304	..Screw, Mtg. (3-48 x 1/4 Binding Head)	2 A/R
13	X2003	..Nut, Mtg. (3-48 Hex)	2 A/R
P5	KBR3-30360†	..Remote Connector (Plug)	1 A/R
--	733C6-3	.Assy. (W/Interlock Power Cable)	--
J4	45025	..Interlock Receptacle**	1 A/R
14	NX90605	..Screw, Mtg. (6-32 x 5/16 Binding Head)	2 A/R
15	NX2106	..Nut, Mtg. (6-32 Hex)	2 A/R
16	SP1906	..Washer, Mtg. (No. 6)	2 A/R
--	733C6-4	.Assy. (W/Interlock Power Cable & Remote Connector)	--
J4	45025	..Interlock Receptacle**	1 A/R
14	NX90605	..Screw, Mtg. (6-32 x 5/16 Binding Head)	2 A/R
15	NX2106	..Nut, Mtg. (6-32 Hex)	2 A/R
16	SP1906	..Washer, Mtg. (No. 6)	2 A/R
J5	KBR3-40360	..Remote Connector (Receptacle)	1 A/R
12	NX90304	..Screw, Mtg. (3-48 x 1/4 Binding Head)	2 A/R
13	X2003	..Nut, Mtg. (3-48 Hex)	2 A/R
P5	KBR3-30360†	..Remote Connector (Plug)	1 A/R

* Refer to Instrument Data Sheet for specific assembly number supplied.
** See Table 5-1 for Power Cord (or Interlock Cable option) and fuse part numbers.
† Supplied with accessories.
†† Specify color and gage.
▽ Will require No. 733B44 impeller if original is not mounted by setscrew.
▲ If original impeller is not mounted by setscrew, carefully break from motor shaft without damaging shaft.
■ See Table 5-1 for impeller cover part number.

TABLE 5-4. MOTHER BOARD ASSEMBLY

Ref. No.	Part Number	Description	Qty.
PCB1	733C18-V	Mother Board Assembly (Complete)	1
1	733B22	.PC Board (Less Parts)	1
2	KPC21M	.Connector, Terminal Post (Male)	27
C1,C3X, C3Y,C4X, C4Y	CEL120	.Capacitor, Electrolytic, 1000µF, 35V	5
C2▲	43129-6	.Capacitor, Electrolytic; 6.8µF, 35V	1
C1X,C1Y, C2X,C2Y	CDC23	.Capacitor, Disc; 0.05µF, 50V	4
CR1,CR3	43421	.Diode; 1N4004	2
CR1X,Y, CR2X,Y	67A15	.Diode, Zener; 1N4744A	4
CR4▲	43421	.Diode, 1N4004	1
CRB1X,Y	DIR960	.Rectifier Assembly, Diode Bridge	2
CRB2X,Y	14127-1	.Rectifier Assembly, Diode Bridge	2
J2	KPC57	.Connector, 7-Pin (TTL Logic)	1
Q1▲	TRAMJE800	.Transistor; MJE800	1
R1	RCC8-470	.Resistor, C.C.; 47Ω, ±10%, 2W	1
R2	RWW20-820	.Resistor, W.W.; 82Ω, ±5%, 5W	1
R1X,Y, R2X,Y	RWW32-208	.Resistor, W.W.; 2Ω, ±10%, 7W	4
R3▲	RCC10-102	.Resistor, C.C.; 1K, ±5%, 1/4W	1
R4▲	RCC10-511	.Resistor, C.C.; 510Ω, ±5%, 1/4W	1
R3X,Y, R4X,Y	RCC4-221	.Resistor, C.C.: 220Ω, ±5%, 1W	4
TB1	KPC56	.Terminal Block (8-Post)	1
3	16755973-007	.Tie (Rubber)	3
4	KPC21F	.Connector, Wire (Female)	10 or 11*
5	ND40034-2	.Lug, Wire Terminal	2
6	733B23	.Cable Assembly (Time Base)	1*
7	733B35	.Cable Assembly, Preamp (Y-Axis)	1
8	733B30	.Cable Assembly, Preamp (X-Axis)	1

*Required for Time Base Option Only.
VRefer to Instrument Data Sheet for Specific Part Number Supplied.
▲See schematic for alternate components used in some versions.

TABLE 5-5. SERVO DRIVE ASSEMBLY

Ref. No.	Part Number	Description	Qty.*
--	733C9-1	Servo Assembly, X-Axis (Complete)	1
--	733C9-2	Servo Assembly, Y-Axis (Complete)	1
1	733C5	.Housing	1
2	43119	.Lockwasher	1
B1	733B12	.Motor, Servo (12V)	1
3	733A9	.Pulley, Belt; 75 Tooth	1
4	733A19	.Pulley, Motor; 14 Tooth (Y-Axis)	1
	733A20	.Pulley, Motor; 10 Tooth (X-Axis)	1
5	733A13	.Nut, Clutch	1
6	ND40140-8	.Ring, Retaining	2
7	70A199-5	.Belt, Servo Drive; 89-Tooth	1
8	NX90608	.Screw, Binding Head; 6-32 x 1/2	2
9	STH440E51F	.Screw, Type "F" Pan Head; 4-40 x 5/16 (Y-Axis)	1
	ND40102-53	.Screw, Round Head, 2-56 x 3/8 (X-Axis)	1
10	733B6	.Sheave, Y-Axis PLASTIC	1
	733B11	.Sheave, X-Axis	1
11	733A47-1	.Shaft, Servo (X-Axis) "LONG"	1
	733A47-2	.Shaft, Servo (Y-Axis) "SHORT"	1
12	HX20593	.Setscrew; 4-40 x 1/4	1
13	733A25	.Bearing, Servo Shaft	2
14	733A48	.Coupler, Shaft	1
15	733A4	.Bracket, Anti-rotation	1
16	ND40219-4	.Setscrew; 4-40 x 3/16	1
R44	RMF15-1000	.Resistor, M.F.; 1K, 1/8W	1
C101	CDC28	.Capacitor, Disc; 0.01µF, 100V	1
R24	733A32†	.Potentiometer, Feedback; 5K	1 A/R
R24, R24-R	733B42	Potentiometer, Feedback W/Retrans. (Option); 5K ea.	1 A/R

* Quantity shown represents total required per assembly. Two assemblies are required per instrument--one for X-Axis and one for Y-Axis.

† Part of Retransmitting Pot. option (when option supplied).

TABLE 5-6. SERVO AMPLIFIER PC BOARD ASSEMBLY

Ref. No.	Part Number	Description	Qty.*
PCB2X	733B27-3	Servo Amp. Assy., X-Axis (English), Complete	1 A/R
	733B27-3M	Servo Amp. Assy., X-Axis (Metric), Complete	1 A/R
PCB2Y	733B27-4	Servo Amp. Assy., Y-Axis (English), Complete	1 A/R
	733B27-4M	Servo Amp. Assy., Y-Axis (Metric), Complete	1 A/R
1	733B27-2	.PC Board (Less Parts)	1
2	KPC21M	.Connector, Terminal Post (Male)	15
3	DIS-UP10-1	.Heat Sink, Transistor	1
4	ND40123-5	.Nut, Pem	2
5	NX1106	.Washer (Flat)	2
6	NX90608	.Screw (6-32 x 1/2)	2
7	**	.Washer (Wave)	1
C2	40763-3	.Capacitor, Disc; 50pF, 1KV	1
C3	CMM84	.Capacitor, Molded; 0.0015µF, ±5%	1
C4,C5	CEL146	.Capacitor, 2.2µF, ±20%, 20V	2
C6,C7	CDC23	.Capacitor, Disc; 0.5µF, 50V	2
C8	40763-1	.Capacitor, Disc; 500pF, 1KV	1
C9	CMM52	.Capacitor, Molded 0.22µF, 250V	1
C10,C11	CEL80	.Capacitor, Electrolytic; 5.6µF, 20V	2
CR1,CR2	43125	.Diode, Zener; 1N823	2
CR3-CR6	DIO4148	.Diode; 1N4148	4
IC1	OPA308A	.Op-Amp; LM308AH	1
IC2-IC5	OPA307N	.Op-Amp; LM307N	4
Q1	FET-J113	.Transistor, FET (E113)	1
Q2	FET-J176	.Transistor, FET (E176)	1
Q3	TRA3904	.Transistor; 2N3904	1
Q4	43210	.Transistor; 2N3906	1
Q5	TRA-MJE2955	.Transistor; MJE2955	1
Q6	TRA3055	.Transistor; MJE3055	1
R1,R2	RCC11-822	.Resistor, C.C.; 8.2K, ±10%, 1/4W	2
R3	PPC52	.Potentiometer; 2K (SPAN)	1
R7	RMF15-10001	.Resistor, M.F.; 10K, ±1%, 1/8W	2
R4	RMF15-10001	.Resistor, M.F.; 10K, ±1%, 1/8W (English)	1 A/R
R4	RMF15-10701	.Resistor, M.F.; 10.7K. ±1%, 1/8W (Metric)	1 A/R
R50	RCC11-475	.Resistor, C.C.; 4.7MEG, ±10% 1/4W	1 A/R
R6	RMF31-49901	.Resistor, M.F.; 49.9K, ±1%, 1/4W (English)	1 A/R
R6	RMF31-42201	.Resistor, M.F.; 42.2K, ±1%, 1/4W (Metric)	1 A/R
R8	RMF4-10002	.Resistor, M.F.; 100K, ±1%, 1/4W	1
R9,R10	RMF4-10003	.Resistor, M.F.; 1MEG, ±1%, 1/4W	2
R11,R12	RMF31-30100	.Resistor, M.F.; 3010Ω, ±1%, 1/4W	2
R13,R33	RCC2-681	.Resistor, C.C.; 680Ω, ±10%, 1/2W	2
R14,R36	POT86	.Potentiometer; 10K (DAMP, GAIN)	2
R15,R16	RMF4-11501	.Resistor, M.F.; 11.5K, ±1%, 1/4W (X-Axis only)	2 A/R
	RMF15-17801	.Resistor, M.F.; 17.8K, ±1%, 1/8W (Y-Axis only)	2 A/R
R17	RCC10-821	.Resistor, C.C.; 820Ω, ±5%, 1/4W	1
R18	RCC10-112	.Resistor, C.C.; 1100Ω, ±5%, 1/4W	1
R19	RMF15-78700	.Resistor, M.F.; 7870Ω, ±1%, 1/8W	1
R20	52123-1	.Resistor; 2210Ω, ±1%, 1/8W (X-Axis only)	1 A/R
	RMF4-36500	.Resistor, M.F.; 3650Ω, ±1%, 1 /4W (Y-Axis only)	1 A/R
R21	PPC37	.Potentiometer; 1K (CAL.)	1
R22	RCC10-512	.Resistor, C.C.; 5.1K, ±5%, 1/4W	1

TABLE 5-6. SERVO AMPLIFIER PC BOARD ASSEMBLY (Continued)

Ref. No.	Part Number	Description	Qty.
R23	RCC10-104	.Resistor, C.C.; 100K, ±5%, 1/4W	1
R25,R34	RCC10-433	.Resistor, C.C.; 43K, ±5%, 1/4W	2
R26	RCC11-332	.Resistor, C.C.; 3.3K, ±10%, 1/4W	1
R28	RCC11-472	.Resistor, C.C.; 4.7K, ±10%, 1/4W	1
R29,R31	RCC10-275	.Resistor, C.C.; 2.7MEG, ±5%, 1/4W	2
R30,R32	RCC11-475	.Resistor, C.C.; 4.7MEG, ±10%, 1/4W	2
R35	RCC11-471	.Resistor, C.C.; 470Ω, ±10%, 1/4W	1
R37,R42,R43	RCC11-102	.Resistor, C.C.; 1K, ±10%, 1/4W	3
R38,R40,R41	RCC2-151	.Resistor, C.C.; 150Ω, ±10%, 1/2W	3
R39	RCC2-681	.Resistor, C.C.; 680Ω, ±10%, 1/2W (X-Axis)	1 A/R
	RCC2-331	.Resistor, C.C.; 330Ω, ±10%, 1/2W (Y-Axis)	1 A/R
W_R	733B29-1-C	.Jumper Assy.	1
TB1	KPC56	.Terminal Block (8-Posts)	1
W1	01266	.Jumper (22 GA)	A/R

* Quantity shown represents total required per PC board. Two PC boards are required per instrument--one for X-axis and one for Y-axis.
** Furnished with transistor.
θ Required for Event Marker option only.
† Refer to instrument Data Sheet for specific part number supplied.

TABLE 5-7. TIME BASE PC BOARD ASSEMBLY (OPTION)

Ref. No.	Part Number	Description	Qty.
PCB3	733B20-1	PC Board Assy., Multi-Rate (English) Complete	1 A/R
	733B20-1M	PC Board Assy., Multi-Rate (Metric) Complete	1 A/R
1	733B21	.PC Board (Less Parts)	1
C301	16800058-001	.Capacitor, Electrolytic; 10µF, 200V	1
CR301	43125	.Diode, Zener; 1N823	1
CR302	43421	.Diode, 1N4004	1
IC301	ICT2005	.Op-Amp; HA2-2005	1
IC302	OPA307N	.Op-Amp; LM307N	1
K301	REL17	.Relay, Reset	1
R301	RMF34-50002	.Resistor, M.F.; 500K, ±1%, 1/4W (English)	1 A/R
R301	RMF10-62502	.Resistor, M.F.; 625K, ±0.5%, 1/4W (Metric)	1 A/R
R302	RMF21-10009	.Resistor, M.F.; 10Ω, 0.5%, 1/4W	1
R304	RMF21-10000	.Resistor, M.F.: 1K, ±0.5%, 1/4W	1
R305	RCC1-102	.Resistor, C.C.; 1K, ±5%, 1/2W	1
R306	RMF15-78700	.Resistor, M.F.; 7.87K, ±1%, 1/8W	1
R307A	RMF34-11000	.Resistor, M.F.; 1.1K, ±1%, 1/4W	1
R308	RCC1-221	.Resistor, C.C.; 220Ω, ±5%, 1/2W	1
R309	PPC11	.Pot, Trim; 100K (RATE BAL)	1
R310	RCC4-751	.Resistor, C.C.; 750Ω, ±5%, 1W	1
R311	RMF21-50008	.Resistor, M.F.; 500Ω, ±0.5%, 1/4W	1
R312	RMF21-40008	.Resistor, M.F.; 400Ω, ±0.5%, 1/4W	1
R313	RMF21-50009	.Resistor, M.F.; 50Ω, ±0.5%, 1/4W	1
R314	RMF21-40009	.Resistor, M.F.; 40Ω, ±0.5%, 1/4W	1
R315	PPC7	.Pot, Trim; 1K (RATE CAL.)	1

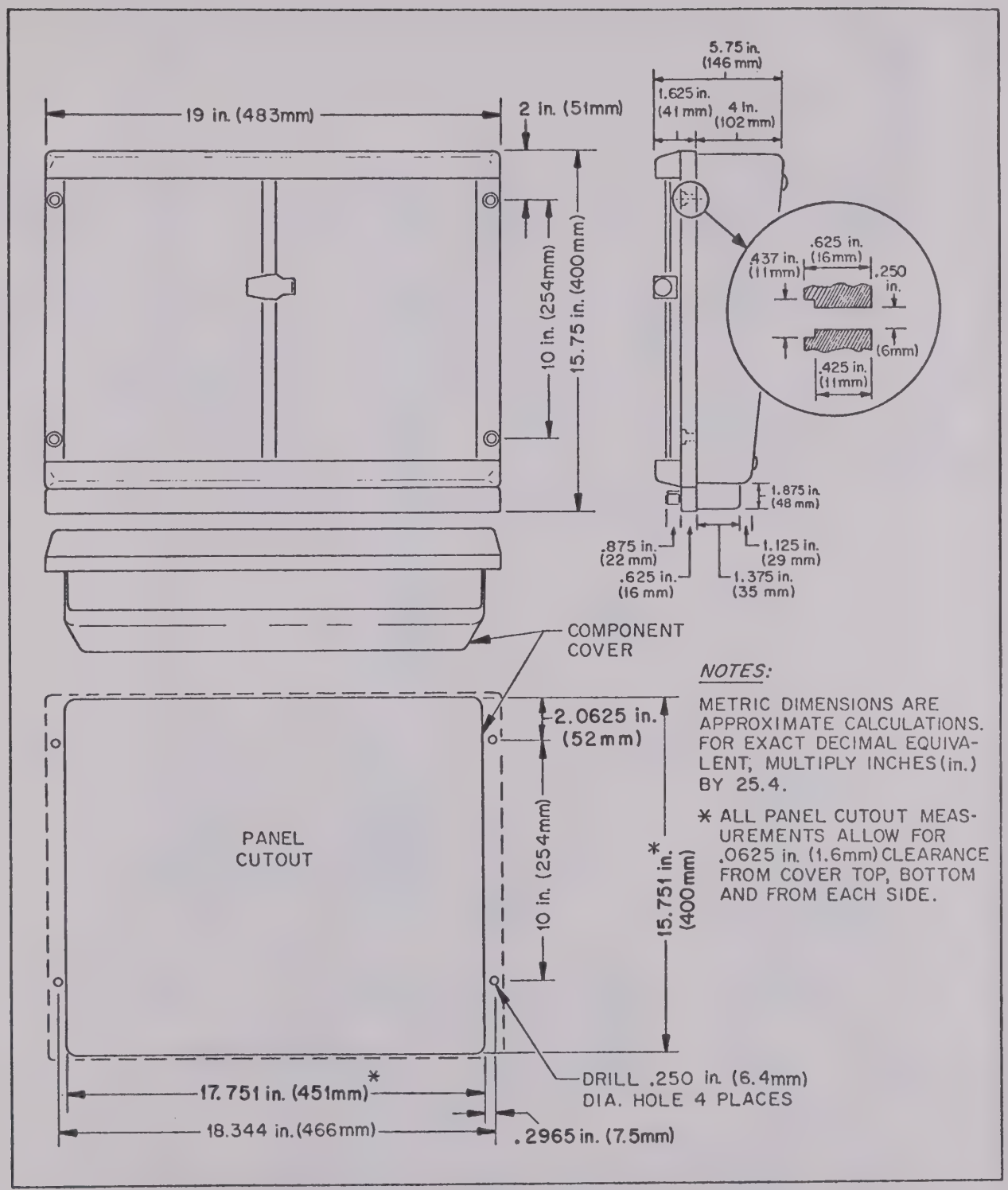
TABLE 5-8. CONTROL LOGIC PC BOARD ASSEMBLY (OPTION)

Ref. No.	Part Number	Description	Qty.
PCB4	733B19-4	TTL Control Logic PCB Assembly	1 A/R
1	733B19-1	.PC Board (Less Parts)	1
2	KPC58	.Connector, Board Pin	7
CR401-CR410	43421	.Diode; 1N4004	10
Q401-Q405	45362	.Transistor; 2N4400	5
R401, R403-R405, R408, R410, R411	RCC11-472	.Resistor, C.C.; 4.7K, ±10%, 1/4W	7
R402,R406, R409	RCC10-223	.Resistor, C.C.; 22K, ±5%, 1/4W	3
R7	RCC10-123	.Resistor, C.C.; 12K, ±5%, 1/4W	1

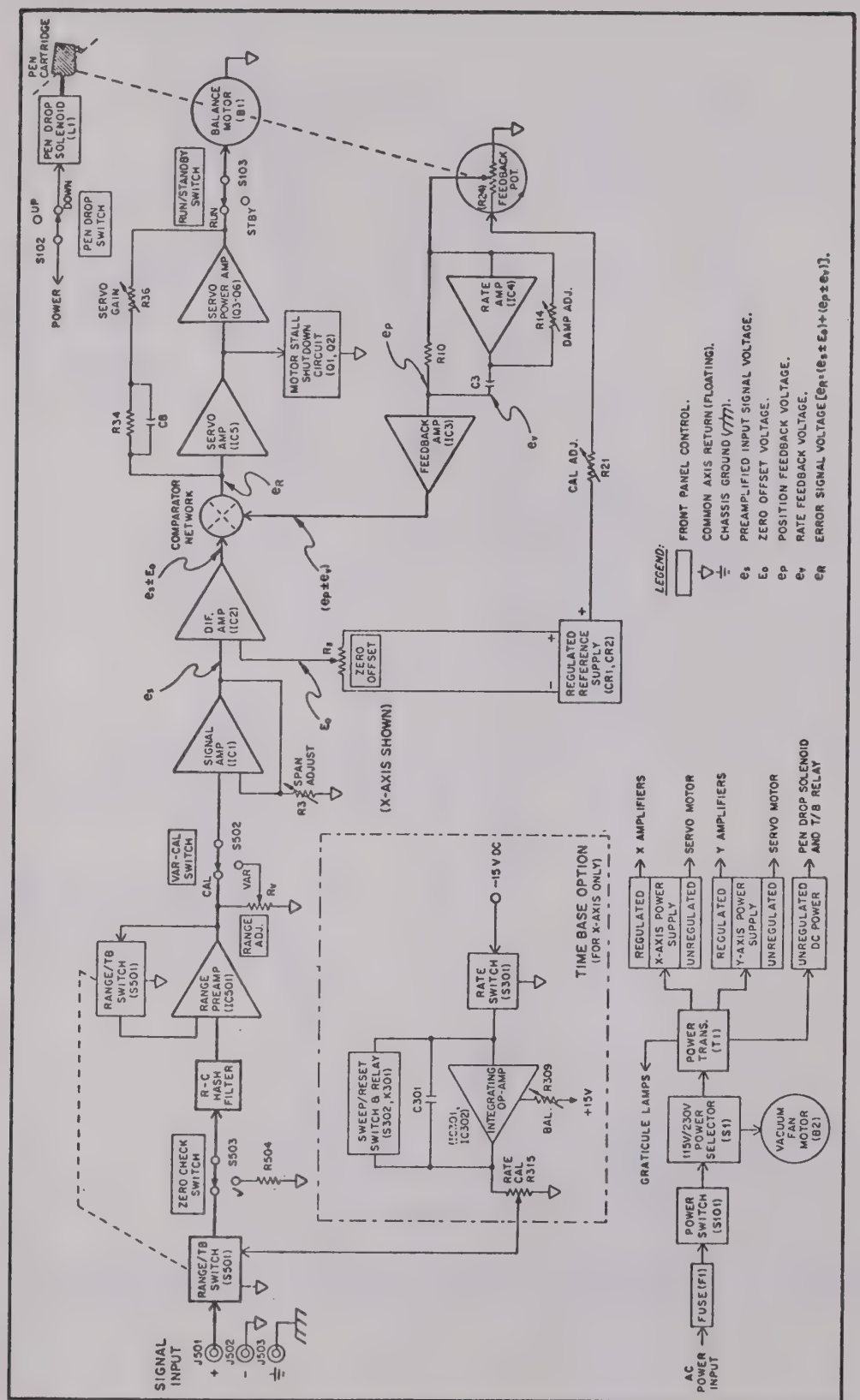
SUPPLEMENTAL INSTRUCTIONS
FOR
MODEL XY575
CONTROL PANEL ASSEMBLY

INTRODUCTION:

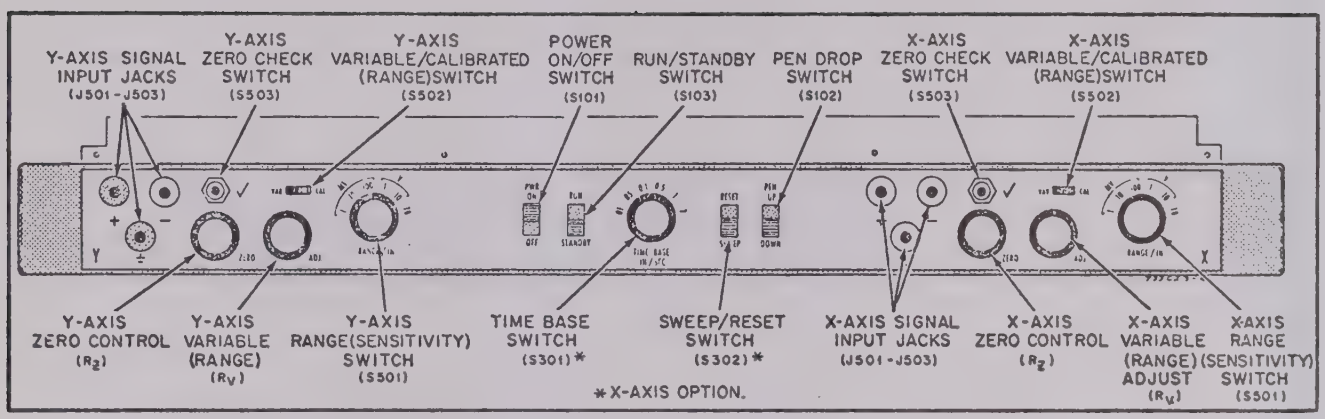
An X-Y Spartan recorder supplied with a Control Module option is similar to the Basic Model XY575 except for the addition of a front-panel attachment. This assembly includes signal input jacks and complete operating controls for both X and Y axes. The modular option provides multi-range measurements and is available with or without X-axis Time Base features. Refer to the following illustrations for additional design details.


19 in. (483mm)
2 in. (51mm)
10 in. (254mm)
15.75 in. (400mm)
5.75 in. (146 mm)
1.625 in. (41 mm)
4 in. (102 mm)
.625 in. (16mm)
.437 in. (11mm)
.250 in.
(6mm)
.425 in. (11mm)
1.875 in. (48 mm)
.875 in. (22 mm)
.625 in. (16 mm)
1.125 in. (29 mm)
1.375 in. (35 mm)
COMPONENT COVER
PANEL CUTOUT
2.0625 in. (52mm)
10 in. (254mm)
15.751 in.* (400mm)
17.751 in. (451mm)*
18.344 in. (466mm)
DRILL .250 in. (6.4mm) DIA. HOLE 4 PLACES
.2965 in. (7.5mm)
NOTES:
METRIC DIMENSIONS ARE APPROXIMATE CALCULATIONS. FOR EXACT DECIMAL EQUIVALENT, MULTIPLY INCHES (in.) BY 25.4.
* ALL PANEL CUTOUT MEASUREMENTS ALLOW FOR .0625 in. (1.6mm) CLEARANCE FROM COVER TOP, BOTTOM AND FROM EACH SIDE.
P1436A

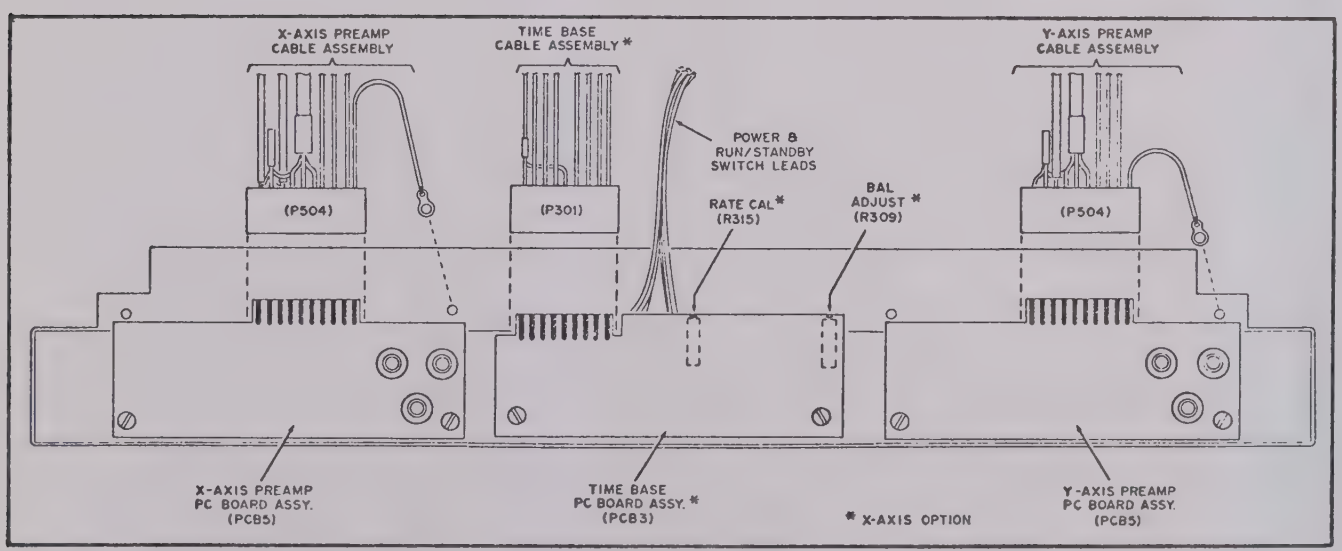
Installation and Dimension Diagram for Recorders with Control Module.



Block Diagram of Recorder With Control Module Option.


Y-AXIS SIGNAL INPUT JACKS (J501-J503)
Y-AXIS ZERO CHECK SWITCH (S503)
Y-AXIS VARIABLE/CALIBRATED (RANGE)SWITCH (S502)
POWER ON/OFF SWITCH (S101)
RUN/STANDBY SWITCH (S103)
PEN DROP SWITCH (S102)
X-AXIS ZERO CHECK SWITCH (S503)
X-AXIS VARIABLE/CALIBRATED (RANGE)SWITCH (S502)
Y-AXIS ZERO CONTROL (R_Z)
Y-AXIS VARIABLE (RANGE) (R_V)
Y-AXIS RANGE(SENSITIVITY) SWITCH (S501)
TIME BASE SWITCH (S301)*
SWEEP/RESET SWITCH (S302)*
X-AXIS SIGNAL INPUT JACKS (J501-J503)
X-AXIS ZERO CONTROL (R_Z)
X-AXIS VARIABLE (RANGE) ADJUST (R_V)
X-AXIS RANGE (SENSITIVITY) SWITCH (S501)
*X-AXIS OPTION.

Front Panel of Control Module Attachment.



Rear View of Control Module with Cover Removed.

IMPORTANT

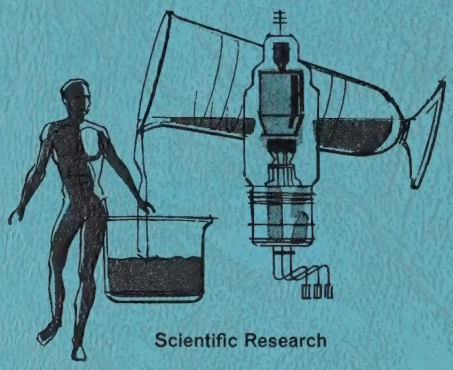
TECHNICAL DATA

ENCLOSED

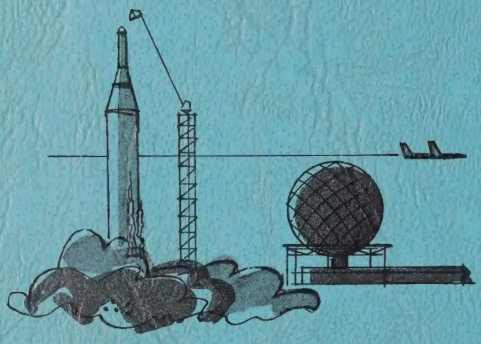
ESTERLINE ANGUS

AN ESTERLINE COMPANY

Manufacturers of DATA RECORDING INSTRUMENTS for . . .



Scientific Research



Space Exploration

Production Analysis

Process Monitoring

ESTERLINE ANGUS INSTRUMENT CORPORATION
P.O. BOX 24000 • INDIANAPOLIS, INDIANA 46224

Printed in U.S.A.